The OTB

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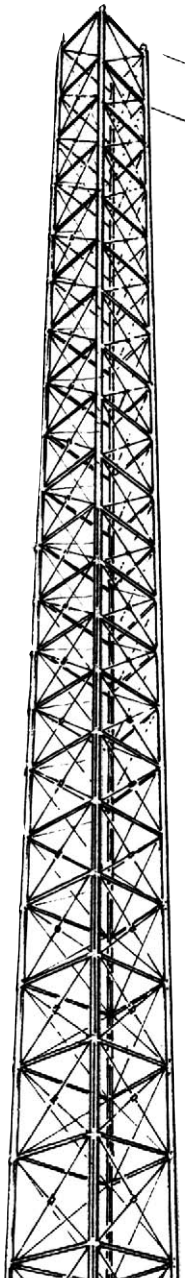
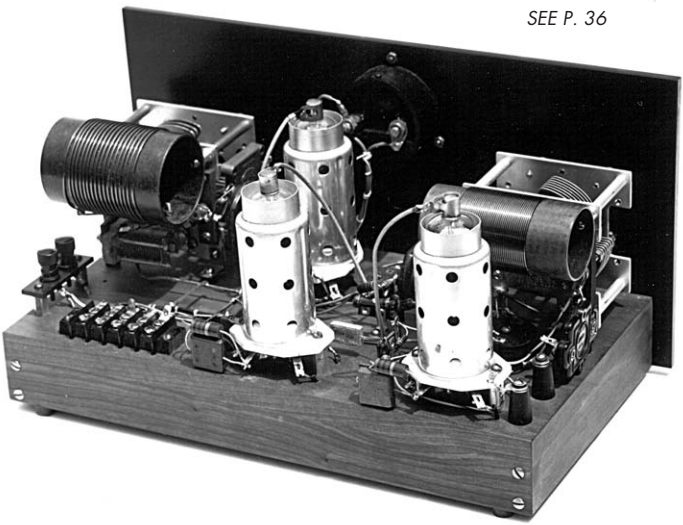
OFFICIAL JOURNAL OF THE ANTIQUE WIRELESS ASSOCIATION, INC.

Published for the collector, historian and old-time radio operator



JOHN ROLLINS' 1930s VFO

SEE P. 36



CONFERENCE 2002 RETROSPECTIVE ISSUE

TIME-SENSITIVE PROXY MATERIALS ENCLOSED
PLEASE REVIEW AT ONCE!

THE OLD TIMER'S BULLETIN

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THE PRESIDENT'S MESSAGE

AWA's Volunteers

I have often remarked here about the volunteers who labor to keep the Antique Wireless Association the viable entity that it is. Certainly the willing cooperation of so many people has made my job over the past seven years much easier as we went through a period of considerable change. I would like to take just a few lines here to recognize and thank at least some of the folks who have worked with me, and perhaps, in the process, you will be able to better appreciate all that they do.

To our loyal and very hard working secretary, Joyce Peckham, my very special thanks for always being available with an answer when I had a question. Among all the other chores she does for us, she keeps the membership lists up to date on a daily basis. Her productivity is remarkable, and her organizational skills are second to none.

To our Museum Curator, Ed Gable, for so willingly taking over the Museum leadership when Bruce Kelley could no longer continue. My own responsibility for this very important activity of the AWA has been transferred to our Museum Director, Tom Peterson. Both Ed and Tom should be applauded for everything they have done to follow through on the project that Kelley started so long ago. Not to be excluded are all the volunteers who work regularly with Ed at the Museum maintaining the collections. I must emphasize that the jobs that both Joyce and Ed do for the organization are very time-intensive.

To our hard-working *OTB* editor, Marc Ellis, who continues to produce a superb publication, in addition to all his other contributions such as the CD ROM versions of *The OTB*. Also in the AWA publications arena we must recognize the volunteer efforts of Chuck Schwark who maintains our award-winning web site, and Tom Perera, now our *AWA Review* editor.

And our appreciation goes also to all the members of the AWA Board of Directors and the AWA Electronic Communication Museum Board of Trustees. Some of these folks travel considerable distances, at their own expense, to attend our board meetings and participate in the ongoing decisions that must be made to set policy and direct the respective officers.

Treasurers...first Dexter Deeley for many years, followed by Stan Avery and Randy Haus. Dexter did not only the treasurer's job but also all the accounting. Stan, now the Treasurer for the Museum, and Randy, now the AWA Treasurer, contribute in other ways in addition to their primary responsibilities. Our financial program is bolstered by the able presence of Tom Peterson, who serves on both boards.

To all the volunteers who maintain the AWA amateur radio programs, contests, nets and the Museum stations. This is a continuous effort, and the work is impressive.

To all those folks who work so hard to put together the Annual Conference under the leadership of Bruce Roloson and Hugh Davey. Included in the list are the awards committees and the folks who staff the registration and book fair.

An extremely important contributor to our conference every year is Lauren Peckham, who puts together the superb programs that distinguish our meeting. I must mention here that with Lauren's almost encyclopedic knowledge of the organization, its background from the early years, and the history of the art in general, as well

(continued on page 6)

LETTERS TO THE EDITOR

All letters to the Editor are read with interest and attention, though not all can be published in this column. Letters may be paraphrased, shortened or otherwise edited to fit the available space. The statements made by our correspondents are their own opinions and do not necessarily reflect the views of either the OTB *staff or the Antique Wireless Association.*

RENAME THE OTB?

It may be sacrilegious, but I'd like to suggest that *The OTB* change its name. Bruce Kelley christened our publication *The Old Timer's Bulletin* when the first issue was typed out in January 1960. The abbreviation *"The OTB"* was so popularly used in conversation that it became the title with the August 1999 issue.

We in the AWA use the abbreviation so often that we don't always think about what it means.

To me, the full title *The Old Timer's Bulletin*

FROM THE EDITOR

Over on the opposite page, President Fizette acknowledges the contributions of many people who give their time and energy to our organization. Included are nice compliments for me and The OTB.

But no compliment to *The OTB* can be accepted without acknowledging the contributions of Claudia Gray Sweet, our designer, and Joe Schroeder, W9JUV, our copy editor. Claudia handles the mass of material I shove into her mailbox every quarter with aplomb and good taste—somehow managing to shoehorn it all onto our small pages, still managing to create layouts that are attractive and engaging.

In the pressure cooker environment of processing a great deal of detailed material with a small part-time staff, a great many typos and other mistakes are bound to creep in—and believe me we have our share. But I know we can't get into too much trouble because Joe Schroeder reads all our page proofs before the book is put together in final form. Joe has put his publishing background and electronic know-how to good use in minimizing embarrassing goofs and keeping us proper and consistent in our typography. Thanks Claudia and Joe. Any compliment to *The OTB* is definitely a compliment to you both!

I also have to acknowledge, with thanks, the major contribution of our column editors who, issue after issue, send me the high-quality material that is the core of *The OTB.*

1930s Night—A New Ham Contest

After several years of working with *The OTB*, it dawned on me that a lot of fine 1920s replica construction projects have appeared on our pages, but there have been very few that recreate 1930s equipment. The elegant Colpitts VFO, beautifully crafted by John Rollins, that graces the cover of this issue is the first one I've seen in quite a while. Yet the "1930s look" is distinctive and interesting, and the more advanced technology of the era offers greater creative opportunities to the designer and builder. So why the neglect?

I thought that it might have something to do with the structure of our OT ham contests. The Bruce Kelley 1929 event (which is really a QSO party rather than a contest) features—of course—1929 and earlier equipment. In the Cundall OT and DX contests, any equipment made in or before 1946, and before 1960, respectively, is welcome. However, these events seem to attract entrants using either their 1929 Hartleys or equipment at more modern end of the "vintage window."

During the amateur meeting at this year's conference, I queried the group to see if there would be interest in a new contest featuring the 1930s. There seemed to be a lot of enthusiasm for it and Randy Haus, KB2PLW, graciously agreed to craft some rules. As most of you contesters know, Randy already runs the popular Linc Cundall DX Contest. Take a look at how Randy has set the contest up in this issue's "Amateur Radio" column.

If you are interested in participating, don't delay, but start putting together your 1930s station right now. Either store-bought or replica equipment from the era qualifies as vintage. Remember that it's unlikely that the contest will continue to be offered if the participation isn't there. So "use it or lose it!" And don't forget to write up your 1930s equipment for *The OTB!*

—MFE

carries with it an unspoken, but very loud message: there's nothing here of interest to anyone under 50. To be sure, the title *could* be interpreted to mean that the publication speaks to those, of whatever age, who like old-time radio. But I don't think that is the interpretation that most people make.

So what could the bulletin be called? This topic may require, and generate, much discussion. But I think it would be a valuable exercise, if nothing else. Just off the top, how about *Radio History Bulletin*? The Online Computer Library Center, Inc. maintains a database of 50 million records of unique book and magazine titles published throughout the world. *Radio History Bulletin* is not among them, so it would be a viable candidate, not duplicated elsewhere. But any appropriate title that is not quite so "age-ist" could work.

Lastly, I want to say that I am *not* passionate about this suggestion. I happen to be 61 years old myself. I know what *The OTB* is and I know what it does. So any messages, disgruntled or otherwise, that might appear in my mail will be welcome. But if a referendum on the matter ever comes down the line, I know how I'll vote.

Might we, after the inevitable shock of change

has inevitably faded, be ready to refer to the *OTB* as, say, the *RHB*?

DAVID KRAEUTER
506 E. Wheeling St., Washington, PA, 15301
kraeuter@sgi.net

The Old Timer's Bulletin *became* The OTB, *in August, 1999, for the very reasons Dave outlines in his letter. At the same time, the cover design was given a more contemporary look. That seemed to be the smoothest way to give us a younger image without turning our backs on our origins. Are further changes needed? If you contact Dave as he suggests, send copies of your correspondence to me so that they can be shared with other members in this column—MFE*

SEEKS ECHOPHONE 50 BACKGROUND

Perhaps one of you collectors out there could help me. I have a very nice Echophone model 50 made by Echophone Radio Mfg. C0, Ltd of Waukegan, Illinois. It is a "semi-tombstone cathedral." The radiused top rises only about 2 1/2" from the beginning of the curve at the sides. It is 13" wide, 16" tall," and 6 3/4" deep.

The 6-tube chassis uses a 35 RF, 24A osc.-mixer, 35 IF, 27 Det.-first audio, 47 output and an 80 rectifier. The wide window dial escutcheon appears to be molded of repwood and carries the "Echophone Super-Heterodyne" logo. The indicator travels in a 90 degree arc. It has three knobs; volume, tuning, and "off-on-tone." This broadcast-only set is an excellent performer with good audio into an 8" Utah speaker.

I'd guess that the set is about 1932 vintage. If any can date it more accurately and tell me a bit about the manufacturer it would be much appreciated. I understand that a number of companies used the Echophone name, including Hallicrafters.

JOHN T. KAETZ, JR.
6841 Chesser Rd., Bessemer, AL 35023
(205) 491-2933

"OOPS" DEPARTMENT

There are a few typos in my article "The Decremeter and Grid Dip Oscillator: VLF Through UHF, Part 1" ("Below 535" Column, August 2002 Issue).

(1) In the second equation, in column 1, page 64 (calculation of Xc), the plus sign is incorrect; it should be a division sign.

(2) In the equation on page 67, column 1, "f2-f1" should be enclosed in parentheses.

(3) On page 68, column two, second from the last paragraph. "Figures 10 and 11" should read "Figures 7 and 8."

I'd be happy to correspond with anyone having questions about this article.

FRANK J. LOTITO K3DZ
1428 O'Block Rd., Pittsburgh, PA 15239
tel 724-327-0501, e-mail K3DZ@aol.com

THE 2002 TCA AWARDS

The Tube Collectors Association has named the winners of its two awards for 2002 at its member meeting in Rochester, NY.

The Stokes Award, named in honor of the late John W. Stokes, author of the widely popular reference *70 Years of Tubes and Valves*, recognizes quality in writing about vacuum tubes. It was presented to George Jessop and Barry Vyse for their book *The Saga of Marconi-Osram Valve—a History Of Valve-Making.*

The Schrader Award was named in honor of the late Howard Schrader, who not only maintained a superb collection but gave other collectors great aid in building theirs. This year's winner is Udo Radtke, DJ5KG, in honor of his excellent collection of tubes, which is widely recognized for its quality and breadth of coverage.

For more information about the awards or TCA, visit the Association's web site at www.tubecollectors.org or contact Ludwell Sibley, (541) 855-5207, tubelore@internetcds.com

From a TCA press release

PRESIDENT'S MESSAGE, *continued from page 4*

as his wide-ranging contacts, he has been invaluable to me over the years as a consultant.

To our two AWA vice presidents, Ron Frisbie and Geoff Bourne, who have assumed other duties as well. Ron is responsible for the various insurance coverages and the developing Chapters program, and Geoff now runs the Conference Contest, which Ralph Williams so ably developed.

With the passage of time the older members have retired, to be replaced by younger volunteers. Fortunately for us, these folks seem to become available when they are needed, and even with all the inefficiencies inherent in any widespread volunteer organization, the work continues. Many of these people are actively employed and are still willing to donate hundreds of hours of work a year to the AWA. Take a good look at page two of any recent *OTB*, and you will see a long list of names. To each and every one, our sincere thanks.

— Bill Fizette

AWA News

***OTB* POLICY ON PROMOTING EVENTS:** The *OTB* is pleased to list the meets and meetings of any established antique radio organization, whether or not it is associated with the AWA. Do not send your information directly to the *OTB* Editor. Please send it to Joyce Peckham, Box E, Breesport, NY 14816. Closing date is six weeks prior to first day of month of issue.

Calendar of AWA Activities

November 8-10
VRPS/AWA Convention

November 10
AWA, Inc. Membership and Board Meeting

November 10
AWA Museum Membership and Board Meeting

Calendar of Meets

(AWA logo identifies AWA-sponsored events)

VRPS/AWA CONVENTION 2002

November 8-10

At the Hampton Inn and Suites, Mesquite, Texas, just east of Dallas on I-635. Old Equipment Contest, Technical Sessions, four auctions, inside flea market, Awards Banquet. Theme: 80 Years of Radio Broadcasting and Radio Manufacturing in Texas. For more information and registration packet, contact Ron Daniel, 1416 Lamplighter Lane, Fort Worth, Texas, 76134, Telephone 817-293-6257 or e-mail to vrps @ ctelcon.net.

AWA, INC. MEMBERSHIP AND BOARD MEETING

November 10

At Rochester Institute of Technology Conference Center (formerly Thruway Marriott). I-90 Exit 46 to I-390 North to NY253 West to NY 15 South. Membership meeting at 11 a.m. All members welcome. Semiannual board meeting follows.

AWA MUSEUM MEMBERSHIP AND BOARD MEETING

November 10

Same location as above. Membership meeting at 2:30 p.m. but will be delayed, if necessary, until conclusion of AWA, Inc. Board meeting. Open to any interested member. Followed by board meeting.

Recurring Meetings & Events

•Antique Radio Collectors of Ohio—meets first Tuesday of each month at 2929 Hazelwood Ave., Dayton, OH (4 blocks east of Shroyer Rd. off Dorothy Lane) at 7 p.m. Also annual swap meet and show. Membership: $10.00 per year. For more info, contact Karl Koogle: mail to above address; phone (937) 294-8960; e-mail KARLKRAD@GEMAIR.COM

•California Historical Radio Society—For info on current meetings, call the CHRS hotline: (415) 821-9800.

•CARS, the Cincinnati Antique Radio Society—Meets on the third Wednesday of each month at ITT Technical Institute, 4750 Wesley Ave., Norwood (Cincinnati) Ohio. For more information contact Greg Tierney, (513) 732-1844, or Bob Sands, (513) 858-1755.

•Carolinas Chapter of the AWA—Hosts four "mini-swap-meets" each year (in January, May, July and October) plus an annual conference, "Spring Meet in the Carolinas," on the 4th weekend in March. Executive committee meets approximately quarterly. For more info, visit the web site at CC-AWA.ORG or contact Ron Lawrence, KC4YOY, Chapter President, P.O. Box 3015, Matthews, NC 28106-3015; phone (704) 289-1166; e-mail kc4yoy@trellis.net

•Central Ohio Antique Radio Assn.—Meets at 7:30 p.m., third Wednesday of each month at Devry Institute of Technology, 1350 Alum Creek Rd., Columbus. (1-70 Exit 103B). Contact: Barry Gould (614) 777-8534.

•Cincinnati Antique Radio Society—Meets at 7:30 p.m., third Wednesday of each month, at Great Oaks Institute, Scarlet Oaks Campus,, 3254 E. Kemper Rd., Sharonville, OH 45241. For info and directions, call Tina Hauke at (513) 771-8840.

•Delaware Valley Historic Radio Club—Meeting and auction begins 7:30 p.m. on the second Tuesday of each month. Location: Telford Community Center on Hamlin Ave. in Telford, PA. Annual dues: $15.00, which includes a subscription to the club's monthly newsletter *The Oscillator*. For more info contact Bill Overbeck at (610) 789-8199 or Dave Snellman at (215) 345-4248. Club mailing address: P.O. Box 847, Havertown, PA 19053.

•The Downer's Grove (IL) Park District Museum sponsors a monthly "Collector's Hour." Participants have the opportunity to display col-

lections at the facility for several weeks before making their individual presentations. The event is open to the public with no admission charge. The museum has also begun to sponsor a yearly "Collector's Fair." For more info, contact Mark Harmon, The Downer's Grove Park District Museum, 831 Maple Ave., Downer's Grove, IL, 630-963-1309, fax 630-963-0496, mharmon@xnet.com.

•Houston Vintage Radio Association—Meets second Tuesday each month (except Jan. and Dec.) at Lai Lai Restaurant, Tides II Motel, Houston Medical Center, Main and Holcombe Sts., Houston, TX. Meetings include auction/program, 7-10 p.m. Assoc. publishes *Grid Leak* quarterly, monthly activity announcements. Membership $15/yr. Write: HVRA, P.O. Box 31276, Houston, TX 77231-1276, or call Richard Collins, (713) 778-0721.

•Hudson Valley Antique Radio & Phono Society—Meets third Thursday of month, 7 p.m. Meeting, swap meet, and membership info: Peter DeAngelo, President, HARPS, 25 Co. Rt. 51, Campbell Hall, NY 10916. (914) 496-5130.

•London Vintage Radio Club—This Ontario, Canada club meets in London on the last Saturday of January, March, May, June and November. Annual flea market held in Guelph, Ontario in September in conjunction with the Toronto club. Contact: Lloyd Swackhammer, VE3I1A, RR#2, Alma, Ontario, Canada. (519) 638-2827.

•Mid-Atlantic Radio Club—Meets monthly, usually the third Sunday of the month at the New Hope Seventh Day Adventist Church, Burtonsville, MD. Contacts: President, Ed Lyon, 11301 Woodland Way, Myersville, MD 21773-9133, (301) 293-1773, e-mail lyon@fred.net or Membership Chair, Paul Farmer, (703) 960-0650, e-mail: oldradiotime@hotmail.com. Website www.maarc.org

•New Jersey Antique Radio Club—Meets second Friday each month, 7:30 p.m. Holds three annual swap meets. Contact (send SASE) Phil Vourtsis, 13 Cornell PI., Manalapan, NJ 07726, (732) 446-2427.

•Northwest Vintage Radio Society—Meets second Saturday of each month (except July and

AWA LIFE MEMBERSHIPS ARE NOW AVAILABLE

Cost: $400 (U.S.)/$500 (Elsewhere)
Send your check to AWA Secretary Joyce Peckham, Box E, Breesport, NY 14816.
Phone (607) 739-5443.
E-mail:awapeckham@ aol.com.

With the Chapters

CC-AWA CHAPTER NEWS: Summer's over and the end of the year is quickly approaching and plans are well underway for the CC-AWA's Annual Conference in Charlotte, NC which is scheduled for Thursday, Friday & Saturday March 20-21-22, 2003. By the time you read this, our Fall Swap Meet in Greensboro/Jamestown NC will have taken place. Assuming that the weather is as nice as it has been in the past, this should be our biggest swap/mini meet yet.

Last year we had the CC-AWA Christmas dinner in Monroe NC at the Sagebrush Steakhouse. It was followed by an Open House at Robert Lozier's home. We're going to do it again this year but with a little twist. Our membership is spread out mostly over the two Carolinas, so it makes it kinda hard for many folks to take part in evening events. With this in mind, I've suggested that other groups around the Carolinas host dinners on the same night. That way more members will have the opportunity to get together for a little social time and good fellowship. This year I'm planning to have the open house for the Charlotte/Monroe area at our home. I guess I better start dusting now...

The next event on the CC-AWA calendar will be the Winter Swap meet at Coughman Park in Columbia SC on January 25th, 2003. This event has really grown in just 3 years and weather allowing should be even bigger next year. All CC-AWA Swap/Mini meets take place on Saturday morning starting at around 8AM, and end before noon. Admission is always FREE. Something to keep in mind about these events is that they always start early and end early. Do yourself a favor and don't bother showing up at 10 or 11 AM, all you'll get to see is folks packing up. That's just the way it is.

For more information about the CC-AWA, membership or events, please visit our web page at CC-AWA.org, or contact CC-AWA President Ron Lawrence at POBox 3015, Matthews, NC 28106, email to KC4YOY@trellis.net, or via landline 704-289-1166.

August), at or about 10 a.m., at Abemathy Grange Hall, 15745 S. Harley Ave., Oregon City, OR. Members display radios, exchange information. Guests welcome at all meetings and functions, except board meetings. For info, write the Society at P.O. Box 82379, Portland, Oregon 97282-0379.

•Oklahoma Vintage Radio Collectors—Meets second Saturday each month, Hometown Buffet, 1012 S.W. 74th St., Oklahoma City, OK. Visitors welcome. Dinner/socializing, 6 p.m.; meeting at 7 p.m. Membership, $12/yr., includes monthly *Broadcast News*. Info: SASE to OKVRC, P.O. Box 50625, Midwest City, OK 73140-5625; or call (405) 755-4139 or (405) 732-6070; or e-mail fkarner@mmcable.com.

•Ottawa Vintage Radio Club—Meets monthly (except June and July) in Conference Room, *Ottawa Citizen*, 1101 Baxter Rd., Ottawa, Ontario. Contact: Tom Devey, 601-810 Edgeworth Ave., Ottawa, ON K2B 5L5, (613) 828-5152. Membership: $10 Canadian/yr.

•Pittsburgh Antique Radio Society welcomes visitors to our Saturday flea market/contests in March, June, September, and December. An auction is included in September, and our annual luncheon/program is held the first Saturday in December. Our newsletter, *The Pittsburgh Oscillator*, is published quarterly. website: www.nb.net/~schaefer/pars.html For directions, specific dates, information call President Bonnie Novak at 412-481-1563 or write to Karl Laurin, 8111 Sally, White Oak, PA 15131.

•Society for Preservation of Antique Radio Knowledge—Meets at 7:30 p.m. the second and fourth Tuesdays of each month in the party room at Cassano's Pizza Parlor, 1700 East Stroop Rd., Kettering, OH. Membership, $18/year. Write SPARK Inc, P.O. Box 292111, Kettering, OH 45429; e-mail sparkinc@juno.com or call John Pansing at (937) 299-9570.

•Texas Antique Radio Club—Meets alternate months in Kyle and Shertz, TZ. Contact: Ron Manning, President TARC, 133 East Huisache Ave., San antonio, TX 78212. Phone (210) 734-6831; e-mail ronmeg@gateway.net; website www.gvtc.com/~edengel/TARC.htm

AWA NETS

PHONE:

SUNDAY:
7244 kHz, SSB, noon (NCS:WA4IAM);
3837 kHz, AM 4 p.m. (E.S.T.), 4:30 p.m. (during E.D.S.T.) (NCSs:W2ZM & W2AN)

TUESDAY:
14274 kHz, SSB, 2:30 p.m. (NCSs KC3YE and W0FXY)
3837 kHz SSB, 8 p.m. (NCS WB2SYQ)

MONDAY-WEDNESDAY-FRIDAY:
3867 kHz, SSB, 9:30 a.m. (NCS: W2OBJ)

CW:

DAILY, 4 p.m., 3588 or 7050 kHz. Protocol, informal. Check both frequencies for activity and join in, or call AWA de (your call) and see what you stir up.

First **WEDNESDAY** of each month, 8 p.m., 7050 kHz
2-M REPEATER (Rochester Area)
MONDAY, 7:30 p.m. (NCS: K2GBR)
Receive 145.290 MHz
Transmit 144.690 MHz

CALL FOR PAPERS FOR AWA REVIEW VOLUME 16

Papers are now being accepted for possible inclusion in Volume 16 of the AWA Review to be published in 2003. Papers on any topic related to the history of wireless and radio will be considered. In an attempt to link the Review articles to the annual conference topics, we are particularly interested in papers relating to the main topic of this year's conference: "50 Years of AWA" and to the various programs and papers which were presented.

Service Sources Available

The AWA Source Sheet is a listing of parts suppliers and services for the radio collector. Cost: only a business-size self-addressed stamped envelope to AWA, Box E, Breesport, NY 14816.

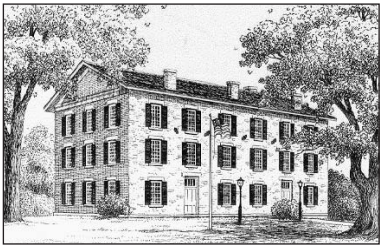
AWA Slide/Video Program

The Antique Wireless Association has available several historical documentaries to loan to affiliated organizations for club meetings and programs. There is no charge for this service other than return mailing cost. For info on loan conditions, to make reservations, or just inquire, contact Ed Gable, Curator, AWA Electronic Communication Museum, 187 Lighthouse Rd., Hilton, NY 14468. The following are available:

(continued on page 13)

MUSEUM NEWS

Visit us on the Internet at http://www.antiquewireless.org



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MUSEUM CONTACT

For all inquiries about the Museum and its operation, contact Edward M. Gable, Curator, 187 Lighthouse Rd., Hilton, NY 14468. Phone: (716) 392-3088, e-mail: k2mp@eznet.net.

The AWA. Electronic Communication Museum is an IRS 501(c)3 charitable organization.

From the Curator

Ed Gable, K2MP/W2AN

Greetings from your museum crew. It was a distinct pleasure to see again, or to meet for the first time, so many of you at the recent AWA Convention and 50th Anniversary bash. What a grand time was had by all, and the Wednesday evening museum visit seemed bigger than ever! I think the creaking floors on the third level attested to that as well. Thanks so much for the numerous kind comments on the museum and the never ending line of improvements your museum volunteers are making.

I know a few of you were able to work the 1950s ham station at the museum, signing W2ICE. It seems some interference from spark transmitters made that a bit difficult! Thanks to Ron Boys, Ron Walker, WA2TT and Ron Roach, W2FUI, for putting W2ICE on-the-air at the museum using a Viking One and HRO-50.

On a personal note, I was really overwhelmed and touched at the many comments from communication radio fans regarding the lack of the ham auction this year. I believe something will be done differently next year in regard to ham and communications gear at the auction.

Now, to the subject of museum news, we are already looking forward to working on new displays and showing some of the wonderful recent donations. Firm plans include a display of all known variations on the National HRO and some foreign made as well, a working mechanical TV of the spinning disk type with sync and video courtesy of Peter Yanczer and Jay Whipple, and finally a working recording outfit where the cutting of original records will be demonstrated by Jack Wenrich assisted by Mike Csontos and John Atwood.

The HRO display is a natural, since we just received the last, rarest and most interesting version, the HRO-600, from member Mike Tannen-

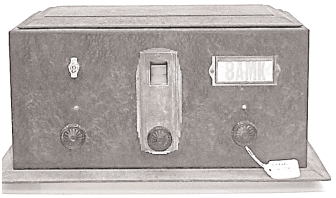
Museum Curator Ed Gable (right) is understandably pleased as he receives the generous gift of a classic National HRO-600 from Mike Tannenbaum, K2BN.

AWA Museum Bid Sale

The following two items have been declared excess due to duplication or other reasons and have been formally deaccessioned. They are offered to AWA members via this bid sale. Send sealed bids to Edward Gable, 187 Lighthouse Rd., Hilton, NY 14468, with name, address and telephone number. Bidding closes December 15, 2002. Questions to k2mp@eznet.net, mail or (585) 392-3088. Buyer pays shipping. Funds go to AWA Museum artifact acquisition fund.

(1) National ACSW58 receiver. Classic 1931 regenerative set with p-p audio output. One set of "yellow" coils, no power supply, with tubes. Modified to add switch upper left and callsign holder on right. Inside original but AF transformers are rusty. Has original Jackson Research tag dated 11/11/31. Electrical unknown. No manual.

(2) McMurdo-Silver Model 5-D receiver, 1.7 to 33 Mcs, by McMurdo Silver and Frank Jones. Two RF stages and crystal filter make this a good performer and the set is further enhanced by its triple-chromed chassis and shields. In good overall condition and plays well. No manual.



The National ACSW58

The McMurdo-Silver Model 5-D

baum, K2BN. Remember, this is your museum, so let me know what display *you* would like to see or how to improve current ones. We already have help from Norm Smith on the transistor display and volunteers from the Tube Collectors Association (TCA) on labeling of the tubes. It is really nice to see members getting involved in their museum.

The annex building is sporting a new outside TV antenna. The metal building made a dandy shielded enclosure and the best we could do was a snowy picture just like the early days. All fixed now. Your man with the hammer and saw, Jack Roubie, K2JDD, has been busy making custom shelves to make sure everything has a place and to get everything off the floor. We also have two new de-humidifiers drying out the library and TV room.

Speaking of the TV room, I hope you saw the just donated RCA PFR-10 Kinescope. This is the last item needed to complete our all-RCA collection of early black and white TV Broadcasting equipment. This pre-videotape equipment consists of the camera, camera control/video monitor, kinescope (video to 16mm film), the film chain (16mm film to video), a ribbon microphone and a remote audio unit. Now, who would like to get that all in working condition ? A new assignment at the museum finds Robert Perry, W2TIX, as the new Registrar, replacing retiring Jack Wenrich, K2RY, who so ably did

(continued on page 13)

RECENT MUSEUM DONORS

(COMPILED SEPTEMBER 20, 2002)

- Jerry Risley, *Heath Apache, National NCX-5*
- Jack Wenrich, K2RYB, *C-474A, vintage batteries, A&B eliminators*
- Tom Rosica, W2GIR, *Sony 4" TV, 100 tubes*
- Gil Chapin, WB2UT, *Large ITT Thyrotron, AF Radar*
- Arthur Harrington, *BC-610E/BC-614, Collins 75A4 & 30S1*
- Ed Gable, K2MP, *Nokia 3-watt cell phone w/acc NIB*
- David Kavanagh, *GE GL-8002 water-cooled tube*
- Morgan Wesson, *Motorola 14" "portable" 1950s, wood*
- John Flinn, N2NOL, *RCA PFR10 Kinescope*
- Mike Tannenbaum, K2BN, *National HRO-600 with manuals*
- John Margosian, *RCA 105 Tetrode thyrotron*
- Paul Bohlander, W3VV, *Silvertone 6V Farm radio*
- Bob Roberts, WA2QAU, *Large glass display case with drawers*
- Edward Duda,**Lafayette Radio product documentation*

**Chief Engineer of Lafayette Radio*

About Our Authors

JIM HANLON, W8KGI
The Hallicrafters SX-28 Super Skyrider (In "The Communication Receiver")

Jim was born in Cincinnati in 1938 and first licensed as WN4VIV from Fort Thomas, KY in 1952. Jim earned BEE, MS and Ph.D. degrees in Electrical Engineering from The Ohio State University where he also taught EE for four years. He worked for Bell Telephone Laboratories for 25 years and transferred to Sandia National Laboratories in Albuquerque where he is currently a Principal Member of Technical Staff. Jim is one of the sponsors of the "Classic Exchange" oldtime equipment contest, and at any given time he has about two dozen transmitters and receivers ready to go on the air. Jim is a member of the ARRL, QCWA and AWA, and he has had many articles published in *Electric Radio* magazine.

JOHN T. KAETZ, JR.
Mica Capacitor Problems
(In "Equipment Restoration")

John was born in 1926 in Birmingham, AL. His first job off the dairy farm at age 16 was as an apprentice radio repairman. He received a degree in electrical engineering in 1948 and joined RCA in Camden and East Orange, NJ, for a short time. He returned to Alabama in 1950 to go into the TV and radio business. In 1955 he took a position with U.S. Steel in as an engineer in electronic maintenance and later went into supervision. Retiring in 1987, he took an engineering job in a small business that designed, built and installed coordinated motor control systems for industrial applications. John retired for good in 1991 and enjoys collecting and restoring antique radios. Since John is also an amateur woodworker, he restores his sets inside and out. There are currently some 150 tube sets and a few early transistors in his collection.

DAVID W. KRAEUTER
Restoring a Duck 5A Loose Coupler (In "Equipment Restoration") and *Radio Men: A Bigraphical Crossword*

David Kraeuter was born in Homestead, PA in 1941. He holds an M.L.S. degree from the University of Pittsburgh. He has edited the *Pittsburgh Oscillator* and the monograph series of the Pittsburgh Antique Radio Society. Currently, David writes the book review column for *The OTB*. Since the 1980s he has been interested in making the vast wealth of information buried in national patent publications more accessible to the public. He thinks he has made a beginning in this work with his latest book, *Radio Patent Lists and Index*, 1830-1980, published by the Edwin Mellen Press. In 620 pages, the book tabulates and indexes 6,200 U.S. and British patents issued to 100 radio and television inventors. David is also working with radar pioneer and writer G.W.A. Dummer of the UK on the 5th edition of *Electronic Inventions and Discoveries*, a chronology of electronic firsts from the 17th century to today.

FRANZ PICHLER
Development of Television in Germany in the Pre-Electronic Period (In "Television")

Born in 1936, Franz was originally trained as a telephone mechanic and worked with the Austrian Telephone Company until 1967. Later, after receiving a Ph.D. in mathematics, he joined the University of Linz, Austria, where he is a professor in the fields of systems theory and information technology. His interest in collecting radios and other apparatus related to information technology began in 1982 when he was associated with SUNY, Binghamton, NY, while on sabbatical leave.

JOHN F. ROLLINS, W1FPZ
Variable Frequency Oscillators—The Colpitts Way

Like so many of us, John Rollins has been interested in radio since boyhood. His hobby activities had to be put on the shelf during World War II, when he served in the South Pacific, and remained there during his college years and early career. John holds B.sc., M.sc. and Ph.D. degrees in Petroleum Engineering, and spent 27 years as an exploration geologist for the Chevron Oil Co. His first ham licenses were foreign: 5R8AR (Madagascar, assigned 1971) and, later, CX9AW (Uruguay). John retired from Chevron in the early 1980s, then spent a few years consulting in the field. After total retirement from the oil business in 1984, he homebrewed (except for the receivers) a serious permanent ham station. Gradually, John's interests and ham activities have gravitated towards the restoration and/or replica building of transmitters of the 1924-1934 period, which he finds a never-ending source of challenge and enjoyment.

JAMES P. RYBAK, W0KSD
Oliver Lodge: Almost *the Father of Radio*

James Rybak was born in Cleveland, Ohio in 1941. He has been interested in both radio and electronics, first as a hobby and then as a profession, for over 40 years. Jim holds B.S., M.S., and Ph.D. degrees in electrical engineering as well as Extra-Class amateur radio license W0KSD. He teaches engineering and mathematics at Mesa State College in Grand Junction, Colorado. In recent years, Rybak has published numerous articles in the U.S. and abroad on the history of both wireless and electrical technology. When not writing articles, he spends his free time trying to achieve "Worked All States" through the low-earth-orbit amateur radio satellites as well as trying to become knowledgeable about digital photography and slow-scan television.

AWA NEWS, *continued from page 9*

VHS VIDEO PROGRAMS

V-2 — "Electrons on Parade." 18 min. 1938 movie made at RCA's Harrison Plant showing production lines with closeups showing receiving tubes, including a short sequence on transmitting tubes. (Very rare movie.)

V-4 — "The British Receiver." Documentary of the AWA/BVPS meet with visit to Marconi's Chelmsford plant, the British Science Museum, and ending with series of collectible British receivers. (VHS program transferred from slides.)

V-5 — "The Early Years." Historical documentary narrated by Clarence Tuska telling of the early years of amateur radio, founding of the ARRL and WW I military radio training school. (VHS program transferred from slides.)

V-6 — "The Key." History of the telegraph/radio key covering early hand keys, semi-automatics and commercial types. Script by Lou Moreau, W3WRE. (VHS program transferred from slides.)

V-9 — "The Transatlantic Tests and 1BCG." Rare documentary/photographs showing early amateur operation leading to famous 1921 transatlantic tests.

V-12 — "Those Wonderful Magazine Covers." The story of radio through magazine covers. Colorful with period music.

V-15 — "The WHAM Story." Details development of a pioneer radio station in Rochester, NY. Program developed with assistance and recollections of Art Kelly, the station's former general manager.

V-16 — "The Charles Herrold Story." Video prepared by Mike Adams who donated this copy to the AWA. It documents the work of broadcasting's Forgotten Father who started broadcasting in 1912.

SLIDE PROGRAMS

S-1 — "Portrait of a Pioneer." The life of Elmo Pickerill.

S-2 — "Polar Adventure." Pictures taken by Bud Waite and his narration describing numerous trips to the Antarctic over a 35-year period.

S-3 — "70 Years of Vacuum Tubes." Describes the history of vacuum tubes.

S-4 — "The Early Years." (See description for V-5.)

S-7 — "The Transatlantic Tests and 1BCG." (See description for V-9.)

S-8 — "Trip Through the AWA Museum" Covers exhibits and equipment.

S-12 — "The Key." (See description for V-6.)

MUSEUM NEWS, *continued from page 11*

that job for many years.

Notice our announcement of two excess items for sale from the museum annex. It is museum policy always to offer excess items to members first, and setting up a bid sale seems the fairest way to do it. See also the Museum Store page, where we are pleased to announce the availability of *AWA Review 15* and a new CD ROM containing the-out-of-print AWA Reviews 6 through 10. The previously sold-out AWA Pins are back as well as the popular high quality blue porcelain AWA Mugs.

Finally, mark your calendars now for the AWA Spring Meet at the Annex where expanded events are planned. There will be a public-invited flea market, a no-commission auction for member's and annex goodies and much more. Details will be included in the next *OTB*. The date is Saturday, May 3, 2003, "dawn 'til gone."

Ed Gable

Ed Gable K2MP/W2AN, Curator
AWA Electronic Communication Museum

Photos by the author.

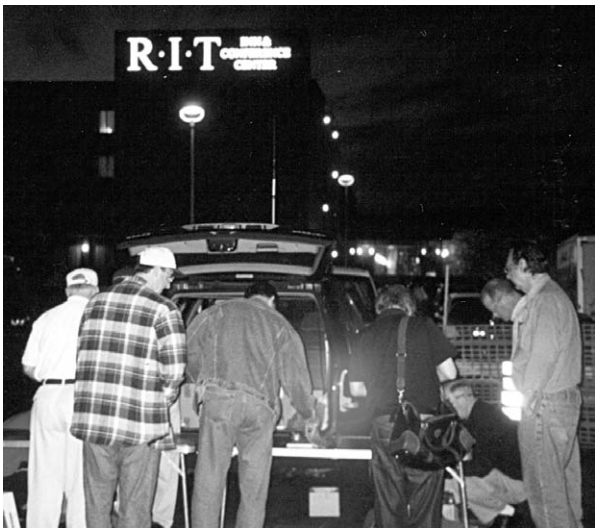
THE 2002 ANNUAL CONFERENCE: ONE MAN'S IMPRESSIONS

By Larry Babcock

For me this year was a fantastic AWA conference, not because of what I acquired but because of the many friends I met that I had not seen since last year's meet and the many very interesting programs and other events. Last year's problems with room reservations were solved by running the conference a few weeks earlier to avoid space conflicts with the returning R.I.T. students. Members who chose to stay at nearby motels were not able to commute by car, but the a free shuttle bus made regular rounds to all major motels. The weather was perfect throughout the meet. I arrived Tuesday evening and stayed until Saturday noon. I loved every minute of it and look forward to it every year.

The official opening of the flea market was one half-hour before dawn at 6:00 a.m. Wednesday, but sellers were allowed to check in, find their spaces and put up their tents on Tuesday evening. A few even set up tables, put out a little merchandise and made sales then. Some buyers were understandably irritated by this but I found it pleasant to walk around, look at things, and talk with people (I didn't buy anything). It was a pleasant way to spend time before Tom Perera's Tuesday evening program "Decoding Nazi Secrets."

There is a potential problem for members who arrive at the meet Wednesday before 8 a.m. because the registration booth doesn't open until then but the flea market starts at 6 a.m. If this happens to you just explain your problem and an arrangement will be made for you to enter and register later.



Wednesday morning flea market earlybirds needed flashlights to find their treasures.

When I hit the flea market at 5:45 a.m. for the official opening on Wednesday, it was still dark and buyers were using flashlights to find their treasures. The AWA registration booth was operating, but there was no long line like last year. Apparently more people had registered in advance, not wanting to waste time standing in line when there were goodies to be found! Sellers reported excellent sales in these early hours.

I saw several sets of interest to me during my first round, but none that I wanted to purchase. Only about 10% of the sellers were set up, so the walk took me only about an hour and I immediately started a second

AUTHOR'S ADDRESS: 8095 CENTRE LANE, EAST AMHERST, NY 14051

The flea market as it looked later on Wednesday morning. Just over 400 spaces were sold, including several on the overflow grassy area.

round.

I saw a Motorola model A1 like the one I carried in the infantry under George Patton throughout WWII! It was in nice condition with the handle not even broken—which is unusual on this model. It was in some ways better than the ones I already have but at $45 I decided to leave it. I also saw an SCR 57 "Signal Corps U. S. Army Airplane Interphone." I collect WWI aircraft radio equipment but this was the only piece I saw here. It was an empty box; the guts had been removed. Still the seller wanted $200 for it. Does anyone have a set of phones for this equipment? It is one thing I am missing. They are designed for mounting in a leather helmet.

There was a very clean Western Electric 4D receiver for $1,000 and a matching 7A amplifier without the three expensive tubes for $500. I can remember some years back when I bought mine with the tubes for $100. A very nice small Amplion horn was priced at $675. It may have been the same one that later sold in the Auction for $600. On one table I saw a Paragon Type Two, a Paragon Type Three, a DeForest D10 with the loop and an Abbotsware horse. All nice pieces but none of them were marked. I don't like to dicker with dealers that don't show their prices. I like to have a place to start. Put prices on your sets if you want me to buy from you!

I recently wrote a booklet on WurliTzer radio and was surprised to find three sets at this meet. They don't turn up often and three at one meet was a lot. First was a WurliTzer Model J at $75. It looked OK but the knobs and speaker were missing and where would I put another console? There was also a working 1926 two-knob battery Model Six offered by John Wiesner at $400. It was fully restored and eventually sold for $350. Later I saw and bought a 1934 model 470B WurliTzer tombstone. It was a model I had pictured in my book, but I had never seen an actual example before. $100 was a stiff price, considering that the cabinet was bad and there was a missing knob, but fixing it up will be an interesting winter job. Incidentally I bought this set late on the second day and the dealer had just arrived. Not everything is sold out in the first few hours of the meet!

By the end of the first day there were still a few empty spaces left on the grassy overflow, and some thought the flea market was a bit smaller than in previous years. However, Ed Gable later told me that all of the available spots had actually been sold. There were 385 spaces on the pavement plus about 20 in the grass. Others thought there there seemed to be fewer buyers, but there were about 850 registered members at the conference, about the same as last year.

01As were selling for $8 and $10 and I noticed by Thursday afternoon that there were still some available for $12 but the cheaper ones were mostly gone. I saw a beautiful Crosley Pup for sale on the second day that I had not seen earlier. I'm talking about the papier mache Crosley dog, not the 1 tube radio. It was priced at $1,250.

There were still a few sellers set up in the flea market on Friday but with everybody inside at the auction all day, I can't imagine they sold much. On Saturday the flea market was totally dead but there were still two programs and a luncheon inside and the AWA museum was open in the afternoon.

Besides the large flea market, this conference also offers a visit to the AWA museum and annex,

Creating the auction room requires all five bays of the R.I.T. Conference Center banquet hall.

an old equipment contest, a large auction starting Thursday evening and ending Friday afternoon, a book fair, two luncheons, a banquet and 13 programs! That's a big meet; I would say the biggest in the country.

As mentioned, there was even a program Tuesday evening: the PBS video "Decoding Nazi Secrets," presented by Tom Perera. Wednesday's programs began with the "AWA Member's Forum," where members could learn more about the operation and mission of their club and ask questions of AWA president, Bill Fizette. Because of a schedule conflict, this was offered at 9 a.m. But after only 3 hours at the flea market, I still hadn't made my first purchase or eaten breakfast. So I had to miss Bill's talk.

Next on Wednesday was Norm Smith's presentation on "Zenith Transistor radios." This included colored slides of many Zenith transistor sets accompanied by musical jingles from early radio stations. It was very cute and well done. For me, the following presentation, Bart Lee's timely discussion "Amateur Radio in Disaster Relief," was a highlight program of the meet. He described his very interesting personal experiences as a radio amateur providing volunteer help in New York City for the week following the 9/11 disaster. Skipping to Thursday, I also

The museum annex houses a nice display of early TV receivers, including several mechanical sets.

Last year, Lud Sibley's trip to Rochester was cut short by a serious auto accident, so he gave his keynote Stromberg-Carlson talk this year instead.

very much enjoyed Buford Chidester's helpful program on cone speaker restoration. I have personally restored four old speakers using Buford's repro cones. They have all worked great. His workmanship and artistry make his cones difficult to tell from the original and he does this more as a hobbyist than a dealer, so his prices are affordable. Questions? E-mail him at speakerpeople@msn.com.

Lud Sibley's Stromberg-Carlson program was to have been the theme presentation at the 2001 conference, but he and his wife were seriously injured in an auto accident while driving to Rochester last year. It was great to see him back in good health! Each of these programs was well attended with about at least 50 to l00 people present.

Other programs included John Rollins, WlFPZ, "Review of Amateur Operations;" "50 Years of AWA" by Dick Ransley (at the Friday night Awards Banquet); "Key and Telegraph Seminar" by Tom Perera; "Moonlight Restoration Forum" hosted by Marc Ellis; and "The Enigma Cypher Machine" by Tom Perera. Two more programs were presented on Saturday. First was Tom Peterson's excellent presentation on "The Life of Hugo Gernsback." The last program of the conference was "Pre 1912 Wireless and Electrical Apparatus," a discussion and display of items shown by members.

The AWA museum and Annex were both open on Wednesday evening and on Saturday and Sunday afternoons. This is one of the few antique radio meets having a world-class museum as part of the program. Preserving and displaying radio artifacts is a major activity of the AWA.

The Old Equipment Contest mirrored the Conference's 50-year anniversary theme by including categories devoted to items that had won a first prize in any previous AWA conference. This assured that some beautiful artifacts would be displayed. Two of my entries won blue ribbons, including a DeForest RJ4 with spherical audion that had won a blue ribbon in Canandaigua in 1987.

Bob Losier had the grandest entry. His Axis Powers Peoples' Radio display filled two full tables. He won a blue ribbon as well as the Display Award, recently renamed for Ralph Williams. Lauren Peckham entered his Armstrong artifacts, including a Multistage RF amplifier used by Armstrong in Paris during WWI. It won the "Best of Show" award as well as a blue ribbon. How could anybody top that?

This year the communications equipment auction was combined back into the general auction Friday afternoon in time for the banquet. Space does not permit an in-depth discussion of auction prices, but there is a report showing the prices of most of the items elsewhere in this issue. The auction started with vacuum tubes Thursday evening. Friday's sales started with paper collectibles. Then followed the general equipment auction.

May I brag by telling you that my single entry won the top bid of any item auctioned? It was a Grebe CR-18. I had noticed that another CR-18 sold for $2,300 in the Ralph Thorn auction and decided to enter mine here. It brought $2,200 with $220 of that going to the AWA. I didn't mind the fee, I was happy to help the club. A selection of other items sold for noteworthy prices were a G.E. John Major Doll ($1,000); a very small Amplion horn with a bell made of wooden petals ($600); a Rogers audio amplifier with PX-25 output tubes ($800); a very early RCA 2-stage amplifier (AH485?) without case ($1400); Ozarka portable in a suitcase ($800).

I noticed that some other things had significantly dropped in value. Cathedrals were really depressed. I can remember when ten years ago any nice cathedral brought at least $300 and a top Philco 90 more than double that. Here, a nice Victor cathedral, working, was no sale at $90 and a GC Philco 91 brought only $100. What's happened here? A Navigator Globe radio of the type sold at the 1939 NY World's fair was a no sale at a top bid of $325. The minimum was $500.

(continued on page 69)

AWA Conference Awards Report

All Photos By Dick Ransley unless otherwise credited.

The AWA Recognition Awards

These awards are traditionally presented on the last evening of the conference at the gala "historical banquet." Nominations for the first six awards listed below are solicited from the AWA membership at large and each winner is selected by a special committee charged with administering that particular honor.

The AWA Houck Award for Documentation goes to an AWA member who has written several original articles on radio development or history in *The OTB, AWA Review*, or other publication. (This can include a book on a related subject.) *Winner: Marc F. Ellis, N9EWJ, for preserving radio history through his magazine articles and through his editorship of the AWA* Old Timer's Bulletin.

The AWA Houck Award for Preservation is for a member who, through personal accomplishment, has acquired, and preserved by documenting, an outstanding collection of radio artifacts. *Winner: John H. Dilks, K2TQN, for his efforts in bringing radio history to everyone with his travelling museum.*

The Bruce Kelley-OTB Award is given to the member who publishes in *The OTB* an article judged to be the most outstanding, original, historical presentation of the award year. For this year, articles in the August and November, 2001 and the February and May, 2002 issues were considered. *Winner: John Casale, W2NI, for his article "The Ghegan Patents" in the August, 2001 issue of* The OTB.

The J. Albert Moore Award comes to us through the Antique Radio Club of America, which was merged into AWA a few years ago. The award honors Mr. Moore's contributions to ARCA. As given by the AWA, it recognizes the *OTB* article, or series of articles, deemed to be the most outstanding of those dealing with radio hardware (radio sets, radio systems or components) printed during the award year. The issues considered are the same as those considered for the Bruce Kelley-OTB Award. *Winner: T.J. Lindsay, for his article "Building a 1929 State-of-the-Art Superheterodyne" in the February, 2002 issue of* The OTB.

The Taylor Award, in memory of John Taylor, RCA TV Developer, is for "preserving television history." *Winner: Dr. Hugo Holden for his restoration of two prewar electronic television receivers.*

The Tyne Tube Award is presented, in remembrance of Gerald F.J. Tyne, for contributions to preserving or documenting the history of tube technology. *Winner: Robert T. Millard for his invaluable to aid to vacuum tube historians:* The

Barney Wooters presents Houck Documentation award to OTB *Editor Ellis, N9EWJ, (left photo), and Houck Preservation award to Al Klase, N2FRQ, accepting for John Dilks, .*

Collector's Vacuum Tube Handbook.

The President's Award for outstanding service to AWA this year: *to Stanley J. Avery, WM3D, for exemplary service to the Antique Wireless Association in numerous capacities over the years.*

The Linc Cundall Awards are presented to the winners of the Linc Cundall Memorial Old-Time CW Contest—Mike P. Sherba, VE3DKW, 450 points—and the Linc Cundall DX Contest—Harry Blesy, N9CQX, 342 points.

This year, two **AWA Board of Directors Special Recognition Awards** were also given. One was presented to Richard G. Ransley *in recognition of his more than thirty years of exemplary service to the association;* the other went to Sherwood Snyder *for his more than forty years of outstanding service.*

2001 Old Equipment Contest Winners

Compiled by Contest Coordinator Geoffrey Bourne

THE THEME CATEGORIES (1 through 10)

In accord with our conference theme "Celebrating 50 Years of AWA," all entries in this category must have won a blue ribbon at a previous AWA contest.

Category 1. Passive Receivers
1st Ernie Hite
1914 Bowman Time Receiver
2nd Bjorn Forsberg
Swedish Crystal Set
3rd Bengt Svensson
Postcard Crystal Set

Category 2. Superhet Receivers
1st Dave Cheney
Northern Electric Model R-4

Category 3. TRF Receivers
1st David Kaiser
1924 Stromberg Carlson 199 Portable Receiver

Category 4. Regenerative and Reflexed Receivers
1st Lauren Peckham
Armstrong Artifacts
2nd Merrill Bancroft
Maclite Receiver
3rd Ron Frisbie
Melodyne AK Receiver

Category 5. Tombstones and Cathedrals
No entries

Category 6. AWA History and Artifacts
1st Charles Stinger
Early AWA Documents

Category 7. Speakers
(a.) Horn
1st Larry Babcock
Unusual Horn Speaker (Mesco)
(b.) Cone
1st Fred Crews
Crosley Musicones

Category 8. Tubes
1st Larry Babcock
DeForest RJ-4 With Audion

Category 9. Spark Transmitters and Artifacts
1st Timothy Walker
Homemade Spark Transmitter

Category 10. Vacuum Tube Transmitters and Receivers
1st John Rollins/Parker Heinemann
1934 Gross Station
2nd John Rollins
Replica 1934 George Kramer Transmitter

THE STANDARD CATEGORIES (11 through 23):

Category 11. Passive Receivers
1st Anders Widell
Two Plug-in Crystal Radios, Austrian/ French
2nd Dave Kraeuter
Duck Navy Type 5A Loose Coupler
3rd Merrill Bancroft
Amrad Model 2575

Category 12. Superhet Receivers
1st Ken Lowther
Zenith 7G605 Transoceanic

Category 13. TRF Receivers
1st Fred Crews
Steinite 1928 AC Receiver
2nd Merrill Bancroft
AK Model 9

Category 14. Regenerative and Reflexed Receivers
1st Merrill Bancroft
Cardwell Model 140-A
2nd Bob Schaumleffel
Connecticut Model DR-6

Category 15. Cathedrals and Tombstones
1st Robert Lozier
Axis Powers People's Radios
2nd Jayne Kaiser
Emerson Model 321-AW
3rd John Deloria
Zenith Model 829

Category 16. Radios in Disguise
1st Ken Lowther
Stewart Warner Book Radio
2nd David Kaiser
Stromberg Carlson Model 240-W
Gov. Winthrop desk

Category 17. Speakers
(a.) Horn
1st Fred Crews
Music Master Horn
(b.) Cone
1st John Deloria
Duval Spirit of St. Louis

Category 18. Test Equipment
1st John Garrison
Westinghouse Oscilloscope
2nd Fred Crews
Triplett Model 1181 Set Tester

Category 19. Tubes
1st Floyd Jury
Geiger Tubes
2nd Marty Reynolds
Progression of Early Radar Tubes

Category 20. Spark Transmitters
No entries

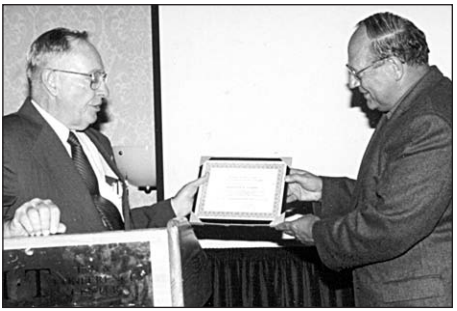
Category 21. Vacuum Tube Transmitters and Receivers
1st Lloyd Jury
WGAL Display
2nd Bill Holly
GE Coast Guard Transmitters

Category 22. Restoration of Operation
No entries

Category 23. Restoration of Appearance
No entries

Category 24. New or rebuilt
1st Stan Hojnacki
3-Tube Regenerative Receiver Armstrong Circuit
2nd Norm Hertz
America Crystal Set 9/11 Memorial

Open Category
1st John Garrison
Flemming battery 18825
1st Merrill Bancroft
James Millen Display



President Fizette, W2DGB, presents the AWA Board of Directors Special Recognition Awards to Richard G. Ransley (left photo) and Museum Curator Ed Gable, K2MP/W2AN, accepting for Sherwood Snyder.

Geoff Bourne, AWA First Vice President and Contest Coordinator, hands "Best of Show" award to AWA Director Lauren Peckham (left photo) and newly renamed "Ralph O. Williams Display Award" (see sidebar) to Bob Lozier.

Robert T. Millard (right) Accepts Tyne Tube Award from AWA Director Lauren Peckham.

A pleased-looking Stanley J. Avery, WM3D, (right) receives President's Award from President Bill Fizette, W2DGB.

MAJOR CONTEST AWARDS

Eunice Thompson Best of Show Award
Lauren Peckham
Armstrong Artifacts Display

Elle Craftsman Award
Stan Hojnacki
3-Tube Regenerative Receiver
Armstrong Circuit

Matlack Transmitter Award
Lloyd Jury
WGAL Display

Ralph O. Williams Display Award
Robert Lozier
Axis Powers People's Radios

People's Choice Award
Lloyd Jury
WGAL Display

CONTEST JUDGES

Christopher Bacon
Ken Owens
Ken Lowther
George Freeman
Geoffrey Bourne

CONTEST COORDINATOR

Geoffrey Bourne

Coming in the next issue: Album of Selected First Prize Winners

This year the Old Equipment Contest Display award was renamed in memory of Radio historian and Atwater Kent expert Ralph O. Williams, N3VT, who became a Silent Key on May 31, 2002. Ralph (here seen at the ceremonial opening of the Atwater Kent plant cornerstone on October 25, 1996 during the teardown of the facility) was instrumental in making the our Old Equipment Contest the major event it is today. An article recalling Ralph s life and accomplishments appeared in the August 2002 issue. Photo by Jeffrey Dilks, KB2CIX, courtesy John Dilks, K2TQN.

ANNUAL CONFERENCE CANDIDS

Auction items receive the usual close inspection from a steady stream of interested buyers.

Bill Ross (left) and Peter Yanczer exchange comments on exhibits in the contest room.

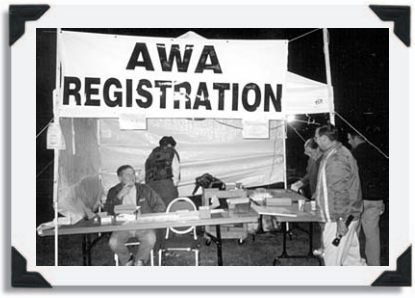
Incoming Conference Chairperson Hugh Davey shares some thoughts with the audience during the Awards Banquet.

A group of intrigued members twiddles the cranks at the Pre-1912 Wireless and Electrical Apparatus Seminar.

Flea market vendor displays a truckload of merchandise under a 3-stall tent. (Larry Babcock Photo)

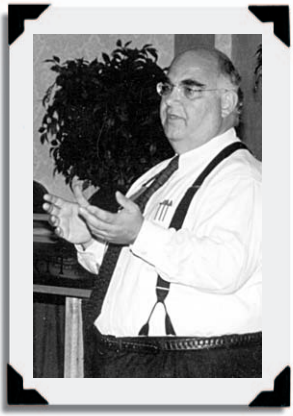
Rita and Merrill Bancroft with Merrill's prize-winning Amrad display.

AWA President Bill Fizette (left) and Museum Director Tom Peterson cut AWA 50th birthday cake at the Awards Banquet.



The AWA registration tent is open and ready to serve the flashlight browsers at the 6 a.m. Wednesday morning flea-market opening. (Larry Babcock Photo)

John Wiesner shows his restored and working 1926 battery Wurlitzer Model 6. It later sold for $350.00. (Larry Babcock photo)



Bart Lee presents "Amateur Radio in Disaster Relief."

The well-patronized outdoor food service area is a convenient spot to relax and chat after a few turns around the flea market. (Larry Babcock Photo)

The Wednesday night open house at the museum always draws a fascinated crowd.

AWA Conference Auction Report

Sale prices for selected items from the AWA 2002 Conference auction records. Every attempt has been made to ensure accuracy in reporting these results, but the AWA cannot assume responsibility for any errors that may occur.

ADVERTISING ITEMS

ARRL	APPOINTMENT SIGN, *Good*	$200.00
CAMEO	GENERAL ELECTRIC DRUM MAJOR	$1,000.00
CBS	21 JACKET-HAT PATCHES, *Excellent*	$55.00
GE	ADVERTISING CLOCK, *Excellent*	$60.00
NEON	RADIO AND CABLE CLOCK, *Good*	$110.00
PHILCO	BACKLIT SIGN	$375.00
RCA	RADIO SCHOOL PROMOTIONAL BOOK	$25.00
RCA	LIGHTER, *Excellent*	$30.00
RCA	POSTER, *Good*	$400.00
VANITY FAIR	MARCONI PRINT BY "SPY", *Excellent*	$80.00

BOOKS AND MAGAZINES

ABC OF VACUUM TUBES, 1922	$22.50
THE ABC OF VACUUM TUBES, E.H. LEWIS, *Good*	$17.50
THE AMERICAN LEONARDO, MABEC, *Good*	$20.00
AUDELS ELECTRICAL LIBRARY, Excellent	$55.00
BOONTON NOTEBOOK COLLECTION, *Excellent*	$75.00
THE BOY INVENTORS WIRELESS TRIUMPH, Good	$17.00
CARBORUNDUM IN RADIO 1926	$11.00
THE CODE BREAKERS, DAVID KAHN, Excellent	$45.00
DAWN OF CENTURY, E.T. PAUL	$50.00
EXPERIMENTS WITH AC, NIKOLA TESLA (1904)	$110.00
ELECTRICITY IN EVERYDAY LIFE, Good	$5.00
GE ENGINEERING DATA, LOT	$30.00
GE MERCHANDISE CATALOG, 1929, *Good*	$30.00
GERNSBACK RADIO ENCYLOPEDIA, Good	$40.00
THE HOME RADIO, 1922	$22.50
HOW TO MAKE A WIRELESS SET, ARTHUR MOORE, *Excellent*	$30.00
OFFICIAL SHORT WAVE MANUAL, GERNSBACK, *Good*	$22.50
OLD TIMER'S BULLETIN, Vol. 1 No. 1, *Excellent*	$32.50
PRECISION MEASURMENTS AND CAL, NBS, *Excellent*	$10.00
PHOTOFACTS 1-80 + INDEX, SAMS, *Good*	$27.50
RADIO BROADCAST MAGAZINES	$27.50
RADIO FOR EVERYBODY, LESCARBOURA, *Fair*	$9.00
RADIO NEWS 41 ISSUES '41-'49 (W/ SIG CORP), *Good*	$25.00
RADIO NEWS SIGNAL CORPS	$11.00
RADIO TUBE TECH. MANUAL, SYLVANIA	$8.00
RIDER TV MANUALS (5), *Excellent*	$9.00
SAMUEL FB MORSE LETTERS, *Good*	$75.00
TENT LIFE IN SIBERIA, KENNAN, *Good*	$37.50
THEREMIN BOOK AND VIDEO, *Excellent, Good*	$60.00

COMMUNICATIONS EQUIPMENT

BUD CODEMASTER, *Excellent*	$10.00
BC 1004-C	$35.00
COLLINS 75A-2 WITH SIGNAL SLICER	$250.00
HALLICRAFTERS P-45 POWER SUPPLY, *Excellent*	$47.50
HAMMARLUND COMET PRO, *Fair*	$75.00
HAMMARLUND COMET PRO, *Fair*	$100.00
HAMMARLUND HQ-160, *Excellent*	$150.00
HOMEBREW 3 TUBE REGEN RECEIVER, *Excellent*	$85.00
INSTRUCTOGRAPH WITH 9 TAPES, *Good*	$20.00
MEISSNER SIGNAL SHIFTER, *Fair*	$5.00
MILLEN 92101, *Excellent*	$11.00
VIBROPLEX KEY, *Good*	$120.00

CRYSTAL SETS

ASTRA LARK GERMANIUM DIODE RADIO, *Excellent*	$40.00
CHEFINGTON CRYSTAL RECEIVER WITH BANK, *Good*	$150.00
FEDERAL JR. XTAL SET, *Fair*	$95.00
FREED MARVEL 101, *Good*	$320.00
HOMEBREW CRYSTAL RECEIVER, *Excellent*	$15.00
HOWE, *Excellent*	$90.00
J. RIGAUT CRYSTAL RECEIVER, BCM/JR, *Good*	$300.00
MARCONI POSTCARD CRYSTAL RADIO, *Excellent*	$200.00
NORDA (GERMAN) CRYSTAL SET, *Good*	$120.00
PHILMORE SUPER RADIO XTAL SET, ORIG BOX, *Excellent*	$60.00
POSTCARD CRYSTAL RADIO KIT, *Excellent*	$90.00
UNKNOWN CRYSTAL SET W/ ORIG BOX	$30.00

MICROPHONES

ASTATIC D104 NEW IN BOX, *Excellent*	$70.00
ELECTRO-VOICE 664, *Excellent*	$25.00
MELODIUM 42B RIBBON, *Excellent*	$300.00
MELODIUM (FRENCH) RIBBON MIC, *Excellent*	$650.00
SEYER MICROPHONE IN BOX	$10.00
SHURE T-17 CARBON MICROPHONE	$3.00
THOMAS (BRITISH) MOVING COIL MIC, *Excellent*	$200.00

MILITARY EQUIPMENT

2 NAVY DEPT BAT. PACKS (WESTINGHOUSE)	$2.00
SIGNAL CORPS R 68 WIRELESS PRACTICE SET, *Excellent*	$45.00

OTHER

BELL 2254 TUNER	$11.00
BOLEX 18-15 PROJECTOR, *Excellent*	$12.00
DEMONSTRATION MULTIMETER, Excellent	$8.00
EMERSON PHONO/RADIO, *Good*	$10.00
FIRESIDE CHAT ORIGINAL PHOTO	$45.00
GE PATENTS (10)	$50.00
GUILD HIGH FI PHONO, GRANFONOLA MD785, *Excellent*	$60.00
HEATHKIT GR-64, *Good*	$10.00
HOMEBREW AUDIO AMP AND XTAL SET COMB, *Excellent*	$30.00
HOMEBREW LOOP ANTENNA, *Good*	$60.00
NATIONAL KNOB, *Excellent*	$15.00
NATIONAL KNOB, *Excellent*	$35.00

PHILCO INTERCOM, *Excellent*	$7.00
RCA BAKELITE RECORD PLAYER, *Good*	$40.00
ROGERS AMPLIFIER, *Excellent*	$800.00
SPARK OSCILLATION COIL, VAR., *Excellent*	$150.00
TEKTRONIX 561, *Good*	$20.00
TUNING COIL TYPE R21	$550.00
ZENITH TRAIL BLAZERS OF RADIONICS	$17.50

RECEIVERS

ALGENE MIRROR RADIO, Fair	$55.00
AMRAD NEUTRODYNE WITH HORN, *Good*	$250.00
ATWATER KENT MODEL 35, *Good*	$65.00
CARDON KIT SET, *Good*	$55.00
CONSTELLATION GLOBE RADIO , *Good*	$180.00
CROSLEY MODEL 50, *Good*	$70.00
CROSLEY 51, *Good*	$80.00
DEFOREST EVERYMAN RADIOPHONE RECEIVER, *Excellent*	$500.00
DUMONT RA346, *Excellent*	$25.00
EGALE HUDSON	$85.00
EMERSON CATALIN, *Fair*	$125.00 30
FADA MODEL 790 AM/FM, *Excellent*	$50.00
FOUR STAR TRANSISTOR RECEIVER	$10.00
FREED MODEL NA 5	$75.00
GLOBE 4 TUBE MODEL 770	$350.00
GOLD MEDAL MODEL #5, *Good* Unknown	$120.00
GREBE CR-9, *Excellent*	$600.00
GREBE CR-18, *Excellent*	$2,200.00
GRUNDIG 2220	$30.00
HALLICRAFTERS 5R51 CLOCK RADIO, *Good*	$40.00
HALLICRAFTERS MODEL 36/UHF COMM RECVR, *Excellent*	$50.00
HALLICRAFTERS SKY BUDDY, *Good*	$95.00
HALLICRAFTERS SX-101, *Good*	$60.00
HALLICRAFTERS TW 1000A WORLD WIDE, *Good*	$110.00
HAMMARLUND HQ-105TR, *Excellent*	$160.00
HARKNESS COUNTERFLEX, *Good*	$70.00
KOLSTER MODEL 20	$60.00
MAGNAVOX TRF MODEL J, *Good*	$50.00
MARCONI TYPE 2, *Excellent*	$210.00
MARCONI R1155, *Excellent*	$500.00
MARVEL SHORT WAVE CONVERTER, *Excellent*	$55.00
MCINTOSH MAC 1700, *Excellent*	$250.00
MERCURY SUPER 10, *Excellent*	$700.00
MIDWEST MODEL 37-18, *Fair*	$425.00
MULLARD RECEIVER, *Excellent*	$35.00
NATIONAL NC-57B, *Good*	$55.00
NEWS, SPORT, MUSIC 1390KC, *Good*	$80.00
NORVER SUBCHANNEL FM REC., *Excellent*	$20.00
O'CONNOR 1925 FREQUENCY CONVERTER	$230.00
OZARKA PORTABLE MODEL NO. 299, *Excellent*	$800.00
PHILCO MODEL 20, *Good*	$100.00
PHILCO MODEL 38-93, *Excellent*	$50.00
PHILCO 51-932, *Good*	$20.00
PHILCO 91, *Good*	$100.00
PHILCO BING CROSBY RECORD PLAYER, *Fair*	$20.00
PHILLIPS CM 27 A, *Fair*	$100.00
PHILLIPS MODEL 2515, *Good*	$110.00
PHILLIPS MODEL 2517, *Fair*	$25.00
PHILLIPS MODEL 9620, *Fair*	$350.00
RADIO SHACK LOGO RECEIVER, *Excellent*	$14.00
RCA 3-BX-671 STRATO WORLD	$55.00
RCA AA-485, *Excellent*	$1400.00
RCA AR 8503, *Fair*	$60.00
RCA RADIOLA W/MODEL100 SPEAKER, *Good*	$80.00
RCA RADIOLA II, *Good*	$80.00
RCA RADIOLA III, *Good*	$60.00
RCA RADIOLA IIIA, *Excellent*	$200.00
RCA RADIOLA IIIA, *Good*	$55.00
RCA RADIOLA 16, *Good*	$70.00
SEARS 8052, *Fair*	$5.00
SEARS SILVERTONE MOD. 2001, *Excellent*	$35.00
SIEMENS GERMAN MILITARY BATTERY SUPERHET, *Good*	$120.00
SPARTON 270 LONDON ONT SET, *Good*	$120.00
SPARTON JUNIOR, *Good*	$90.00
STEWART WARNER 91-51, *Good*	$35.00
STEWART-WARNER 91-62, *Good*	$50.00
STROMBERG-CARLSON 231-R, *Good*	$250.00
TRAVELER 5054 MIDGET, *Excellent*	$45.00
VICTOR MODEL #106	$55.00
WESTINGHOUSE RADA, *Good*	$175.00
WESTINGHOUSE WR-8	$210.00
ZENITH A404, *Excellent*	$35.00
ZENITH B600 TRANS-OCEANIC, *Good*	$75.00
ZENITH 5S319, *Good*	$140.00
ZENITH 6A40, *Good*	$85.00
ZENITH ROYAL 250, *Fair*	$6.00
ZENITH 500H TRANSISTOR, *Good*	$85.00
ZENITH TRANS-OCEANIC MODEL 8G005YT, *Good*	$75.00
ZENITH TRANS-OCEANIC, *Excellent*	$190.00
ZENITH TRANSOCEANIC 600 SERIES, *Excellent*	$85.00

LOUDSPEAKERS

AMPLION, *Excellent*	$280.00
AMPLION DRAGON, *Excellent*	$600.00
ATWATER KENT TYPE F-4-A, *Fair*	$15.00
ATWATER KENT TYPE M, *Fair*	$35.00
CROSLEY DYNACONE, *Fair*	$42.50 98
LEAF BURKHART CONE SPEAKER, *Excellent*	$110.00
MUSIC MASTER, *Fair*	$120.00
STEWART-WARNER DANCING GIRLS, *Excellent*	$375.00
TEMPLE BALANCED ARMATURE, *Good*	$75.00

TELEGRAPH

BRITISH LANCASTER BOMBER KEY, *Excellent*	$25.00
CONN TEL & TEL BOYS TELEGRAPH SET, *Good*	$220.00
FOOTE F P AND CO. KS-3106-F7218, *Good*	$10.00
IVALEK PRACTICE TELEGRAPH KEY, *Good*	$20.00
LANDLINE KEY UNKNOWN MFR., *Good*	$50.00
MCELROY MAC OSCILLATOR, *Good*	$10.00
STANDARD LANDLINE KEY (1850), *Good*	$30.00
WE 22A RELAY REPEATER, *Excellent*	$22.50

TEST EQUIPMENT

BOONTON Q METER MODEL 160A, *Excellent*	$27.50
CENTURY CT1 CAPACITOR TESTER, *Excellent*	$24.00
GENERAL RADIO SIGNAL GENERATOR, *Excellent*	$37.50
GENERAL RADIO 174 WAVE METER, *Good*	$30.00

HEATH 4205 SCOPE WITH MANUAL	$20.00
HICKOCK 295X SIGNAL GENERATOR, *Good*	$17.50
HP AUDIO OSCILLATOR, *Excellent*	$22.50
HP MILITARY VOLTMETER, *Excellent*	$5.00
JACKSON TUBE TESTER, *Good*	$5.00
LEEDS BRIDGE, *Fair*	$8.00
RCA WO-33A SCOPE, *Good*	$35.00
SIMPSON 381 CAPACITY BD., *Excellent*	$30.00
SUPREME MODEL 500, *Good*	$37.50
TEKTRONIX L/C WITH METER, *Good*	$30.00

TRANSMITTERS

COLLINS XCITER PROTOTYPE, *Good*	$37.50
CONN TELE WW1 AIRCRAFT SPARK BC-15 A	$100.00
HEATHKIT DX-100, *Excellent*	$35.00

TUBES

AMPEREX C-100A, *Excellent*	$100.00
AMPEREX EL-36, *Excellent*	$10.00
AUDIOTRONAND TUBE ADAPTER, *Good*	$230.00
CETRON C3J/5632, *Good*	$1.00
DEFOREST AUDIO 410, *Good*	$80.0
EIMAC 2 - 4X150 Unknown	$5.00
GE CG-1787, *Excellent*	$35.00
GE FG 105, *Excellent*	$2.00
GE GEC X4 Excellent	$400.00
GE GL-845 AND GL242C, *Excellent*	$65.00
GE 851 N.I.B., *Excellent*	$40.00
LE DE LUXE VM 77	$160.00
MOTOROLA TUBE CADDY, *Excellent*	$45.00
MULLARD KT-88, *Excellent*, *Good*	$160.00
MYERS, *Good*	$60.00
NAGGARC SC1, *Good*	$10.00
NATIONAL 833A	$10.00
OSRAM PHOTOCELLS, *Good*	$70.00
QRS HIGH VOLTAGE RECTIFIER, *Good*	$65.00
RAYTHEON 2J22, *Fair*	$15.00
RAYTHEON ML 5541, *Good*	$50.00
RCA 6U5, *Excellent*	$50.00
RCA 3- 829 B	$6.00
RCA 3- 83-A, *Excellent*	$6.00
RCA 845 Unknown	$95.00
RCA 849/549 Unknown	$20.00
RCA 5820, 5820A, *Good*	$30.00
RCA UV-207 Poor	$21.00
RCA WD-11 Excellent	$50.00
RCA WD-11 Good	$55.00
RCA WD-12, *Excellent*	$40.00
ROGERS BOX LOT OF TUBES	$30.00
RRF M530, *Good*	$55.00
SIEMANS 3-EF86, 3-ECC82, *Excellent*	$10.00
SILVERTONE 247(1), 224(2), 227(2), 235(2), *Excellent*	$25.00
SYLVANIA 807, *Excellent*	$1.00
SYLVANIA 7868-P FACTORY MATCHED PAIR, *Excellent*	$50.00
TUNG-SOL 4 TUBES, *Excellent*	$25.00
UNKNOWN CROOKES TUBE WITH WHEEL, *Excellent*	$140.00
UNKNOWN EARLY CRT, *Good*	$185.00
UNKNOWN ML 102-A, *Excellent*	$25.00
UNKNOWN XENON RECTIFIERS MISC	$3.00
UNKNOWN 833 TUBE, FIL, *Good*, NO SHORTS	$15.00
UNKNOWN 10 TUBES # 26, *Good*	$40.00
UNKNOWN 4 NEW 00A TUBES, *Good*	$15.00
WE MANOMETER D-79510, *Excellent*	$70.00
WE VT1 OR 203A, *Good*	$45.00
WE 214E, *Good*	$60.00
WE (2) 216 A TUBES	$120.00

SILENT KEYS

We record the passing of the following AWA members with deep regret.

EDWARD DERVISHIAN*, W9VSU, 86, (7-28-02), instructor and engineer.

ROLAND EMERICK

HELMUT JOHN GEISLER, W2KEY, 80, (1-4-02) was an electrical engineer with IBM at East Fishkill, NY until his retirement in 1977.

*Ed Dervishian taught electronics at the American Television Institute (ATI) in Chicago and served as the last personal assistant to Dr. Lee Deforest while Dr. Deforest was Research Director at ATI. During WWII Dervishian was involved in the development of radar and served as a Naval Radar Inspector. Later he was employed by Motorola for twenty years and in retirement assisted in the development of the Motorola Museum of Electronics in Schaumburg, IL. He also served on the Telecommunications Advisory Committee of the Village of Lincolnwood, IL and had been a licensed radio amateur since 1930. *Thanks to James T. Hawes, AA9DT.*

Note: AWA officers and members are requested to submit all information about Silent Keys, with or without special recognition, to Joyce Peckham, Secretary, Box E, Breesport, NY 14816. This will help in the collection, coordination and appropriate recognition of both AWA members and others who have made contributions to the electronics and entertainment industries.

BY JAMES P. RYBAK

OLIVER LODGE: *ALMOST* THE FATHER OF RADIO

By the year 1887, the 36-year-old Oliver Lodge was already regarded in Great Britain as a highly accomplished scientist. A professor of physics at the newly-established University College in Liverpool, he was known for his brilliant scientific mind and ability to explain complex scientific principles in a manner that could be understood by virtually anyone. In 1887, the Royal Society of Arts asked Lodge to prepare a series of lectures, to be given the following year, concerning how buildings might best be protected from lightning damage [1].

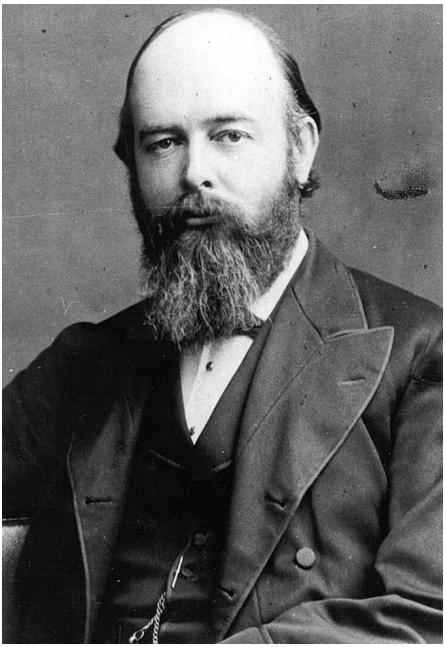
The designers of the lightning protection systems of that time assumed that lightning was a continuous direct current discharge. They believed that protection from lightning could be obtained by placing copper rods above the buildings and connecting them to the earth by means of heavy copper grounding cables with a very low dc resistance [2].

The lightning protection "experts" could not understand why lightning discharges frequently ignored the copper conductors and chose what seemed to be higher resistance "alternate paths" to ground [3]. This often resulted in great damage being done to the buildings. Such failures of the lightning protection systems was typically blamed poor ground connections[4].

Lodge had had an interest in learning more about the subject for several years [5]. He now planned to conduct a series of experiments on electrical discharges prior to giving the lectures. The scientist intended to learn why lightning often did not follow the low-resistance path provided by the copper conductors [6]. He immediately began a series of experiments to learn more about lightning protection.

These laboratory investigations proved to be extremely important. They would contribute substantially to the development of wireless telegraphy and establish Lodge's world-wide reputation as an outstanding scientist.

In addition to demonstrating the effects of inductance in circuits with time-varying currents, the experiments ultimately resulted in Lodge establishing the existence of electromagnetic waves independently of, but virtually simultaneously with, the German scientist Heinrich Hertz. Lodge also discovered the phenomenon of electrical resonance and found that the "coherer" effect provided a very useful means for detecting the presence of electromagnetic waves [7].



Sir Oliver Lodge. Smithsonian Institution Photographic Services.

It was commonly known in 1887 that a lightning discharge is produced when the accumulation of electric charge in a cloud causes the potential difference between that cloud and the earth to increase until the intervening air breaks down electrically and becomes a conductor. Lodge visualized this as being much the same process as when the voltage across a capacitor increases until the breakdown of the dielectric occurs [8]. It

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also was well known that the discharge of a Leyden jar (capacitor) produces an oscillatory current rather than a direct current [9]. Oliver Lodge erroneously believed, therefore, that a lightning discharge also is oscillatory [2].

The physicist decided to perform some preliminary "alternate path" experiments to attempt to confirm his theories prior to giving his first lecture on lightning in March of 1888. He used Leyden jar discharges to simulate lightning. The jars were usually charged using a Voss machine that generated static electricity through friction. One of the experimental arrangements used by Oliver Lodge is shown as Figure 1 [4, 6].

The Voss machine was connected to the terminals, A. These, in turn, were connected to the inner conducting surfaces of two Leyden jars. The outer conducting surfaces of the jars were connected to an adjustable spark gap, B. A long loop of very low resistance copper wire, L, was connected across this spark gap. The wire Lodge first used was approximately 12 meters in length but had a resistance of only .025 ohm [4, 6]. It wire closely simulated the characteristics of the conductors normally connected to lightning rods.

The electrical charge stored in the Leyden jars could flow either through the very low dc resistance path provided by the loop of wire or it could flow across the very high resistance path through the air between the spark-gap terminals at B. It would seem that the obvious path for the charge to follow would be through the low resistance wire loop. Surprisingly, Lodge was able to produce very large sparks across the spark-gap, B, even though the dc resistance of the wire across the gap was only a fraction of an ohm [4].

When Lodge gave his first lecture on lightning to the Royal Society of Arts, he argued that since (as he believed) lightning discharges have a very high oscillatory frequency, it is necessary to take inductive reactance effects into account when predicting which path the discharges will follow. Inductance was not a very well understood or accepted concept in those days [6].

Michael Faraday in England and Joseph Henry in the United States, independently but almost concurrently, had observed some effects of inductance almost sixty years earlier. Sir William Thomson (Lord Kelvin) in 1853 had recognized the influence which inductance (Thomson called it "electro-dynamic capacity") has in causing the discharge of a Leyden jar to be oscillatory [9]. Oliver Heaviside later demonstrated the importance of inductive effects in the transmission of signals along long telegraph lines and undersea telegraph cables. The concept of inductance, however, did not receive general acceptance or understanding until Sir William Thomson (Lord Kelvin) publicly endorsed Heaviside's inductance theories in 1889. Lodge's lectures on lightning, however, occurred prior to Thomson's endorsement [2].

Lodge maintained that, at the frequencies involved in the oscillatory lightning discharge, the inductance of the conducting cables resulted in a very high opposition to current flow. Therefore, the alternate path actually followed by a lightning discharge did indeed exhibit the lowest total opposition or impedance to the current flow even if its dc resistance was not the lowest [6].

Those in attendance who did not subscribe to Lodge's inductance theories were quick to question the accuracy of simulating lightning with Leyden jar discharges. Particularly questionable, they argued, was the idea that a lightning discharge is oscillatory [1].

Years later, Lodge realized that lightning is not an oscillatory discharge but is actually a rapidly pulsating unidirectional (dc) discharge [2]. However, the effects of the inductive reactance on the flow of these pulsating lightning currents is the same as Lodge predicted for oscillatory currents [6].

The issue could not be resolved satisfactorily at the March lectures, and the critics wanted more convincing experiments to be performed. Further discussions on lightning were scheduled for the September 1888 meeting of the British Association to be held at Bath, England [1].

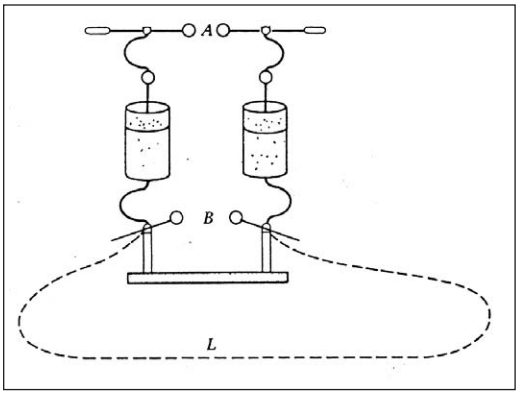

Fig. 1. Lodge's "alternate path" experiments demonstrated the effect of inductance in lightning protection circuits.

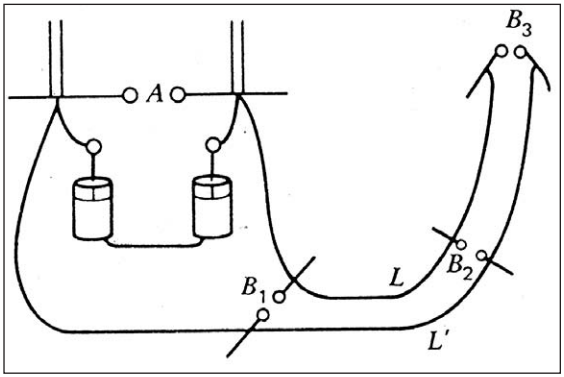

Fig. 2. While experimenting with this circuit, Olover Lodge verified that the electromagnetic waves predicted by Maxwell do indeed exist.

Oliver Lodge continued his "alternate path" experiments during the spring and summer of 1888 with the purpose of investigating the behavior of the electrical oscillations produced by the Leyden jar discharges. He now replaced the loop of wire he had been using with a pair of long wires, each approximately 29 meters in length (Figure 2). The wires, L and L', were terminated in spark-gaps [4, 6]. He found that the Leyden jars discharged in the usual manner at spark-gap A, but that a simultaneous spark was produced at spark gaps B1, B2, or B3.

Oscillatory currents were produced in the part of the circuit consisting of the Leyden jars and the spark-gap at A. The capacitance of the jars together with the inductance of the spark-gap wires at A determined the frequency of the oscillations [4]. Every time a spark occurred at A, however, Lodge found that a longer spark occurred at B1, B2, or B3. The spark at B3 always was the longest.

The electrical waves produced by the oscillations at A traveled along the wires and were reflected at the far ends. Lodge knew that the longer spark at B3 was due to what he called the "recoil impulse" or "recoil kick" at the end of the wires where the waves were reflected [4]. At spark gap B3 both the incident wave and the reflected wave had their maximum values and were in phase. This produced a voltage twice as large as the voltage at spark gap A.

More importantly, Lodge determined that the discharge at B3 was the most intense when the lengths of the two wires L and L' were one-half wavelength (or an integral multiple of one-half wavelength) for the oscillations produced [4, 8]. Under these conditions, a maximum coupling of the oscillations produced at A was occurring in the wires. Oliver Lodge had discovered electrical resonance (or "syntony" as he later would call it [6]) between the two parts of the circuit [4, 8].

In addition, the scientist was able to demonstrate that standing waves existed along the wires. In a darkened room, he observed a visible glow along the wires at one-half wavelength intervals corresponding to the voltage peaks. He also performed a number of other experiments concerning the characteristics of discharging Leyden jars during that spring and summer of 1888 [11].

Oliver Lodge clearly knew that he had produced and detected the electromagnetic waves predicted some twenty-four years earlier by James Clerk Maxwell [3]. Before he presented these observations as part of the findings in his study of lightning conductors, however, Lodge went on vacation in that summer of 1888. It was while on vacation that Lodge read of Hertz's similar work with electromagnetic waves [6, 10]. Lodge then added a postscript to his own paper acknowledging Hertz's work in an extremely positive way. He concluded the postscript by saying: "The whole subject of electrical radiation seems working itself out splendidly" [8].

Lodge presented his findings to the British Association meeting in Bath in September of 1888. The well known theoretician, G. F. FitzGerald, who reported on the results Hertz recently had published, chaired the meeting. Interestingly enough, FitzGerald had told Lodge in 1878 that it never would be possible for anyone to produce the electromagnetic waves predicted by James Clerk Maxwell. By 1882, however, FitzGerald had corrected his erroneous belief [12]. The following year, FitzGerald suggested that electromagnetic waves might be produced by discharging a capacitor through a very small resistance [3].

Those in attendance and, later, other knowledgeable people, recognized that Lodge's findings were equivalent to those of Hertz and had been arrived at independently of, and virtually simultaneously with, Hertz's [3, 6]. Heinrich Hertz, however, would always receive the world's principal acclaim and recognition because his work was published slightly before that of Lodge.

The electromagnetic waves generated by Hertz were radiated into space whereas those generated by Lodge were guided by wires. Con-

sequently, the work of each man helped confirm the validity of what the other had done. Lodge and Hertz corresponded and exchanged scientific papers. They always maintained great respect and regard for each other as scientists and as human beings [3]. Lodge never resented the fact that Hertz's work received greater acclaim [6]. When Hertz died in 1894, Lodge wrote a magnificent tribute to his achievements [13].

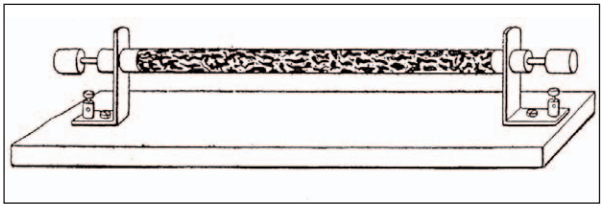

Fig. 3. Lodge's early "metal filings coherer" used to detect electromagnetic waves.

In 1894, Lodge discovered that a nonconducting tube containing metal filings (Figure 3) could be used to detect the presence of electromagnetic waves. His findings were based on an observation made in 1890 by Edouard Branly (1846-1940). Branly had discovered that the resistance measured across the ends of a such a tube normally was very high. However, if an electromagnetic wave was generated nearby, the metal particles became fused together and the resistance dropped to a low value. The resistance remained low until the tube was tapped and the fused particles returned to their original, separated condition [14].

Earlier, Lodge had observed the same fusing effect between metal spheres in light contact with each other when an electromagnetic wave was produced. He called the fusing of the metal produced by the electromagnetic wave, the "coherer effect." Similarly, he called any detector of electromagnetic waves based on this effect, a "coherer." He quickly realized that the "filings tube coherer" represented the most convenient form for utilizing the coherer effect to detect electromagnetic waves [15].

Perhaps Lodge's most important improvements to the filings tube coherer were the evacuation of the air from the tube and the development of an automatic "tapping back" device which utilised a rotating spoke wheel driven by a clockwork mechanism. The mechanical impulses provided by the tapping back device restored the filings tube coherer to its non-conducting state at regular intervals, independent of the detection of electromagnetic waves. This filings tube coherer detector was considerably more sensitive than was the simple wire loop "resonator" with a spark gap that Heinrich Hertz had used as the detector of electromagnetic waves in his experiments. It also was more convenient to use than was the metal-sphere coherer detector Lodge had previously developed [15].

Lodge used his improved filings tube coherer, together with a Hertzian wave oscillator, as part of a demonstration for a commemorative lecture entitled "The Work of Hertz" given in London at a meeting of the Royal Institution in June of 1894. A sensitive mirror galvanometer was connected to the coherer so that the detection of the electromagnetic waves was visible to the audience in the form of a moving beam of light [6, 16]. Later that same month, Lodge used a small portable receiver based on similar equipment to demonstrate the detection of electromagnetic waves at the annual "Ladies' Conversazione" of the Royal Society in London [6, 17].

He also demonstrated essentially the same apparatus at a meeting of the British Association held at Oxford in August of 1894. In that demonstration, however, he replaced the mirror galvanometer with a more sensitive marine galvanometer of the type normally used for the detection of submarine cable telegraphy signals. Lodge's source of electromagnetic waves, located in another building some 55 meters away, consisted of a Hertzian oscillator energized by an induction coil. A telegraph key connected to the primary winding of the induction coil was used by Lodge's assistant to send both long and short duration trains of waves, corresponding somewhat to Morse code dots and dashes [6]. Those in attendance witnessed Lodge's receiving equipment detecting electromagnetic waves that had traveled the 55 meter distance.

Lodge clearly had all the necessary elements of an elementary wireless telegraphy system. While it could be argued successfully that Lodge did indeed achieve signaling of a sort in all three of these demonstrations, there is no indication that the sending of any true messages was accomplished or even attempted with this apparatus. It was not his intent to do so. Oliver Lodge never considered using his equipment for communicating, although the idea of wireless telegraphy had been suggested two years earlier by William Crookes [18].

The first two demonstrations were performed simply to show that electromagnetic waves can be generated and detected. The purpose of Lodge's demonstration at Oxford was to propose

that perhaps there exists an analogy between the way a coherer responds to electromagnetic waves and the way the eye responds to light [6].

Oliver Lodge later admitted that, at the time, he had not seen any advantage in using the relatively difficult process of telegraphing across space without wires to replace the well developed and comparatively easy process of telegraphing with the use of connecting wires.

He, like virtually all of his contemporaries, believed at the time that electromagnetic waves travel only in straight lines as does light. (Maxwell, after all, had shown that light is nothing more than electromagnetic waves with very short wavelengths.) Consequently, Lodge assumed that the maximum possible range attainable using wireless signaling would be very limited. These reasons help to explain why, in Lodge's own words, ". . . stupidly enough no attempt was made to apply any but the feeblest power so as to test how far the disturbance could really be detected" [19]. As a result, Lodge was one of several electrical experimenters who, had they recognized what they had in their hands, might have earned the principal credit for the development of wireless telegraphy.

In all fairness, however, one should never think that Lodge was lacking in either insight or in astuteness. His exceptional perceptiveness and keenness of mind when conducting experiments had been demonstrated time and time again. But he was first and foremost a scientist and teacher, more concerned with theory than commercial applications. [6].

While Oliver Lodge is remembered for numerous significant scientific achievements, including his contributions to the development of wireless telegraphy, it might be said that he let "the two big ones" slip through his fingers. Had he proceeded with his alternate path experiments a little more rapidly, Lodge might be the one whom we today credit with having experimentally verified Maxwell's predictions. Similarly, if Lodge had realized the potential of wireless communication, Marconi might have had to share with him the unofficial but commonly used title "Father of Radio."

Those wishing to read about other aspects of Oliver Lodge's life are referred to the author's earlier, less specialized article [20].

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THE VACUUM TUBE

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The Tube Scene in 1952

AWA dates its start from 1952, and its best known founder, Bruce Kelley, was a lifelong tube collector. It may be of interest to take a look at what was happening in the world of electron devices back then.

All manner of new tubes were being introduced at the time. The year started with RCA's rollout of the still-famous 6146 beam-power tube and its 26.5-volt cousin, the 6159. Basically scaled-up versions of the 2E26, these efficient "button-stem" designs were promoted for use in VHF transmitters at first. However, the 6146 was soon being advertised, and used, at all frequencies, and blossomed into "the 807 of the '50s."

Lots of new tube designs of the day were intended for use in TV sets. Few of them are of great interest, but an exception was the 6CL6 from RCA. Intended as a high-performance video pentode, it quickly became a favored driver tube in amateur transmitters.

Another famous tube of 1952 was Tung-Sol's 5881, which still draws respect from audio users. Announced as a replacement for the 6L6, it seems to have been developed, with major internal changes, from the 6AR6. The latter was a radar sweep amplifier designed by Bell Labs during WW II and produced heavily by Tung-Sol. Apparently encouraged by success of the 5881, Tung-Sol followed-on with its 6550 two years later.

The postwar years were the time of immense stocks of military surplus tubes. Here are some prices that a sharp-eyed buyer could find in ads of 1952:

1L6	$0.98	274A	$9.95
2A3	$0.95	274B	$2.65
10Y	$0.35	275A	$4.50
45	$0.89	300B	$9.95
50	$0.65	350B	$4.95
80	$0.65	801A	$0.45
211E	$12.50	VT-4C	$0.45
212E	$42.50	VT-52	$0.29

These prices are in Old Dollars, of course (multiply by about five to get prices in today's money), but those who cruise eBay for tubes may snicker at the numbers "back then." The prices of the Western Electric 211E and 212E reflect their use in many broadcast transmitters of the day, while the VT-4C and VT-52 were viewed as merely obsolete triodes with little use.

Computers used lots of tubes in 1952: the IBM 604 employed 1400 of them and the Navy's Project Typhoon had 4000. They ran with careful power conditioning to stretch out the lifetime, plus lots of air conditioning to carry away the heat.

Tube production was quite high, although a bit below the level for 1951. Production for the year was about 110 million receiving tubes, valued at $220,000,000; plus another 1.1 million black-and-white picture tubes worth $44,000,000. About 950 million tubes were in use in radios and TV sets. Sylvania announced manufacture of its billionth tube in 1952, on the path toward its three billionth in 1973. The Navy reported that the typical aircraft carrier contained 13,000 tubes—not including the equipment on its aircraft. That's remarkable, not just from the sheer number, but because those tubes were essentially all "JAN"-qualified military types.

Tube manufacturers were a constantly changing set. The big names like GE, Raytheon, RCA, Sylvania, Tung-Sol, and Western Electric were doing well. Westinghouse announced formation of a new Electronic Tube Division in New York State with its picture and power tubes made at Elmira and receiving tubes at Bath. Philco's Lansdale Tube Company was prospering. So, apparently, were CBS' Hytron and National Electronics. National Union was slipping toward exit from the industry.

The rebuilding of TV picture tubes was a "hot" business 50 years ago, so much so that an oversupply of rebuilders popped up. That was the fate of Arcturus Electronics, which was making new picture tubes at the time and invested heavily in a remanufacturing plant. The even-

(continued on page 35)

EQUIPMENT RESTORATION

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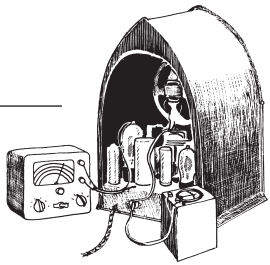

Mica Capacitor Problems—Restoring a Duck 5a Loose Coupler

This contribution is from John Kaetz, Bessemer, AL.

Mica capacitors are very dependable components and, as such, are often overlooked as problem sources during antique radio restoration. They were used when stability and efficiency were important and still find applications today, though ceramic and other newer materials have replaced mica in many applications. Mica capacitors were widely used in tuned circuits and for coupling and bypassing in radio frequency (RF) circuits. In spite of their dependability. they are subject to the same failure modes as other capacitors such as opens, shorts, leakage, intermittents and value changes. The following case histories illustrate the point.

Case 1. A dual conversion Westinghouse WR-315 began displaying drastic gain losses intermittently after repairs were made. Touching anything in the set with a test probe would restore normal operation for varying lengths of time. Monitoring various points over a considerable period of time pointed to the first 100 kHz IF transformer as the culprit. Upon opening it, a 60-year-old winding termination was found to be innocent of solder. The cleanup, soldering and reassembly resulted in no improvement. Having a 50-50 chance of being right the second time, the 500 pF postage stamp mica across the primary winding was replaced. This cured the problem.

Case 2. A 46-250 Philco would abruptly change frequency just enough to almost lose the station it was tuned to. If left alone it would shift back then hop away again. Coils almost never act this way. Tuning capacitors and trimmers may do so, but will usually be noisy during tuning. The only component left besides the tube is the oscillator coupling capacitor. Replacing it cured the problem.

Manufacturing methods used in those days can explain the capacitor's behavior in the previous examples. They have a book style configuration with alternate layers of metal foil extending left and right of insulating sheets of mica separating them. The ends were folded in various ways depending on the maker and were clamped together with a metal band to which the lead wire was attached. The lead wire sometimes was also the clamping agent.

The connection between the various foil sheets and the lead wire was dependent on pressure. The assembly was then encapsulated in a plastic (usually phenolic) thermosetting cover under pressure hoping it would be impervious to moisture and other contaminants. Over the years, heat cycling, defective sealing and severe environments took their toll and loosened or corroded these pressure connections to cause intermittent operation.

Case 3. Leakage was sometimes a problem also. A 5-tube AC/DC set would gradually lose volume and become distorted over a short time. The 12SQ7 plate voltage ultimately dropped to about 8 volts. Bridging the plate load resistor was no help. Disconnecting the 250 pF mica bypass restored normal performance. The capacitor checked good with

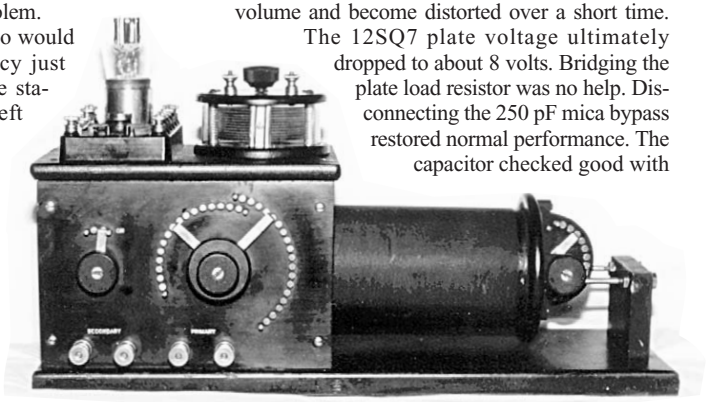

Fig. 1. The William Duck 5A loose coupler with Paragon V.T. control and Murdock capacitor.

an ohmmeter and capacitance bridge. Test instruments often don't apply enough voltage to a component to make the defect appear.

Another type of mica capacitor frequently used is the deposited film style in which a metal film is evaporated onto both sides of a mica sheet. These are very stable when encased in epoxy or other suitable material, but can be a source of much grief when used uncased as they were in IF transformers of the 50s and 60s and sometimes late 40s. Most of these were made on one sheet of mica which contained two capacitors, one for each transformer winding.

The film for the primary and secondary tuning capacitor was usually not separated by more than 1/16". It was very common for moisture and dirt to cause leakage across this gap, which resulted in noise, poor sensitivity, distortion and occasionally tube failure because of positive grid bias passed by the leakage.

These transformers, especially the larger units, can be repaired by separating the two capacitors. This can be done by cutting the mica sheet between the two with a razor or other sharp blade. The construction of the smaller 3/4" transformers may make this impossible, though many can be saved.

You may also remove the old capacitor(s) and replace them with the small dipped mica units. Most of these capacitors, in 455 kHz units, are in the 100 pF to 250 pF range with 150 pF being quite common. If the old component can't be measured try something in the above range and see if the transformer will tune somewhere near its old setting. The tuning action will usually reveal whether an increase or decrease is needed.

Often the primary and secondary use different values with the secondary being larger on the output IF unit.The first IF usually uses the same value. If the old capacitor was an odd value, use two capacitors in parallel to approximate it. You may mount the new components externally. Keep leads short and don't forget to insulate the tabs inside that contacted the film on the old capacitor so they don't short out the winding.

These tips should be useful in repairing some of those great old radios.

♦ ♦ ♦ ♦

David Kraeuter (Washington, PA) describes the restoration of a modified Duck loose coupler he found in the local college basement.

McMahon's *Vintage Radio* (page 153) dates the loose coupler of Figure 1 at 1915, with William Duck as the manufacturer. The same unit (Model 5A) also appears, evidently then as

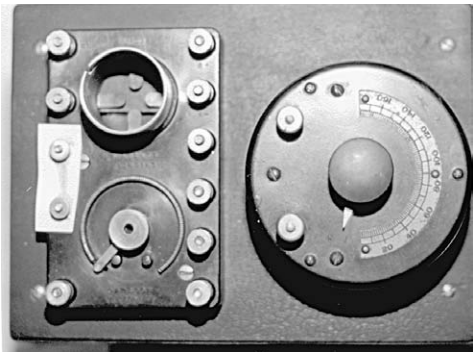

Fig. 2. Top view of the tube and variable capacitor "upgrade." Pencil line on white paper at left is the grid leak.

government surplus, in the 1923 Montgomery Ward radio equipment catalog (page 26). Price, $9.95. The description there states that it "has wave range up to 4000 meters (75 kHz) and is very effective on short wavelengths, 200 to 600 meters (1.5 to .5 MHz)." I imagine the loose coupler, without the tube and capacitor now mounted on top, spent the first few years of its career reproducing only the humble dots and dashes of Morse code, with little volume.

Consider the 1915 shipboard Navy radioman, in what might not have been the quietest environment, attempting to receive a message with the Model 5A. Here's how Edwin Armstrong described such a situation in *Proceedings of the Radio Club of America*, 25, p.1 (1948):

It was a world where communication was confined to the American and Continental Morse codes as manifested in headphone whispers, and where the strength of the signal heard was completely dependent upon the amount of energy that could be captured from the passing electromagnetic wave by the receiving antenna. That energy, and that alone, was all that was available to move the diaphragm of the receiving telephones. In order to hear weak signals it was necessary to use painfully tight headphones, frequently with the equally uncomfortable necessity of holding one's breath for prolonged intervals.

Little wonder then that someone "souped" this 5A by adding a Paragon V.T. (vacuum tube) control, patented 1921, and Murdock variable capacitor, (*Vintage Radio*, p. 162). The entire ensemble, as shown, was found in a storage room in the basement of the physics building at a local college. It will be returned to the college after restoration is completed.

Figure 2 is a top view showing the Paragon detector and Murdock capacitor. The white ob-

ject at the left is a piece of paper for the user to make a "pencil line" grid leak according to the Paragon literature. The circuit diagram is shown as Figure 3.

The trickiest part of this restoration was working with the solder connections on the switch terminals behind the front panel. Each coil tap was attached to its terminal with a 1/16" bead of solder, and over the years the connections had eroded. Some of the connections broke as the front panel was separated from the wooden case.

Another problem with this old unit was dirty connections. I used an ohmmeter to test all conductors in the set, and this detected the open circuits between the rotary switch shafts and their associated slip connectors. These could not be removed for cleaning without risking major damage to the connectors; fortunately they responded well to the application of cleaning fluid.

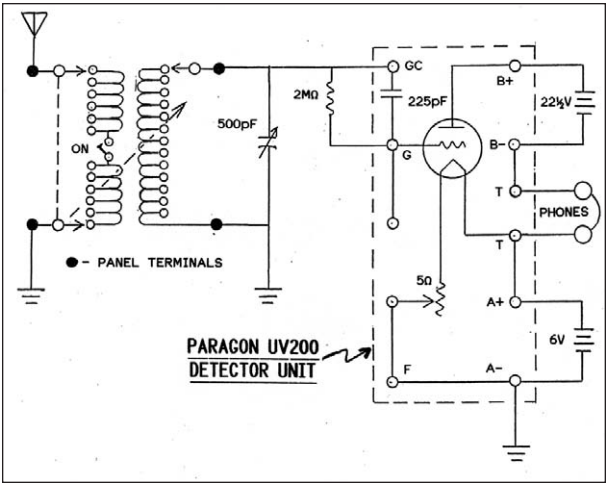

Fig. 3. Schematic of loose coupler and its upgrades. Drawing by John Haught.

We have John V. L. Hogan to thank for inventing single-dial tuning. Unfortunately his work, patented in 1912, was not incorporated here. There are at least four variables that determine the receiving frequency of the 5A: the two tap switches that control the effective length of the primary coil, the tap switch for the secondary coil, and the relative positions of the two coils. Adding the Murdock capacitor affects the tuning further.

Historical propriety says this radio really shouldn't play the Beach Boys' "Good Vibrations", but that's what I heard when I first connected the set.

The last restoration act was rubbing a white crayon across the lettering—"PRIMARY," "SECONDARY" and "ON"—etched into the front panel. This made them look close to "like new." Was this going too far?

THE VACUUM TUBE, *continued from page 32*

tual bankruptcy marked the end of the company.

In transmitting tubes, Taylor Tubes lingered on, having long lost its prewar prominence. General Electronics was struggling but improving its Government-contract business. Eitel-McCullough was busy introducing advanced transmitting tubes. Penta Labs, formed by break-away Eimac employees, was just getting started. Heintz & Kaufman was sliding toward its 1953 bankruptcy. Lewis and Kaufman was in a similar posture, although it later reappeared under new ownership as Marshall Electronics. Specialty microwave-tube houses like Bomac and Varian Associates were busy with military orders.

Despite general prosperity in the tube industry, there was continuing interest in the new transistor. Aspiring manufacturers ran awkward ads explaining how mass production would get started "soon." Bell Labs held an industry seminar in April, wherein companies licensed to use Western Electric's patents got a full briefing on not merely the virtues of the new device, but also how to actually make it. Manufacturing techniques were well enough developed to fill a two-volume book, *Transistor Technology*, with the story of how to take commercial-grade germanium, re-refine it into single-crystal ingots, and make the result into point-contact transistors. This was at the height of the Korean War; the book wasn't "classified" in the military sense, but was marked RESTRICTED — SECURITY INFORMATION on its cover and was serial-numbered. At the same time, Western Electric started offering small quantities of production transistors, 1698s and the like, that are highly collectible today.

As remote as it may seem, this 1952 view was the state of the electron-device world at the start of AWA.

BY JOHN F. ROLLINS, W1FPZ

VARIABLE FREQUENCY OSCILLATORS—THE COLPITTS WAY

From time to time, some of the younger hams (under 50 years!) in the AWA group have asked me how to build a variable frequency oscillator free of chirp and significant drift. Over the years of building and tinkering I think that I can reduce the requirements for a good VFO to a few items. These are: favorable tubes, good circuit design, good components, a well designed power supply and lastly, good construction techniques.

General Considerations

This article is presented not so much as a specific building project, but rather as a generalized review, highlighting problems that can trip up the unwary builder. Two usable circuits are illustrated (Figures 1 and 2), but it is hoped that the builder will use these only as a guide.

The first requirement will be the selection of tubes for the VFO. Most tubes, large and small, can be made to oscillate in some fashion, but some are much better than others as regards to power requirements and freedom from chirp. Do you want to build a vintage Electron-Coupled-Oscillator circa 1929-1932? . . . a late thirties VFO using the latest metal tubes of the day? . . . a post WWII VFO of the late fifties that will qualify for the AWA old time DX contest?

Variable frequency oscillators for any of these periods may be built to operate successfully with a little planning and parts collecting. For the 1929-1932 period the tube selection is rather limited. Common types are the 45, the 27, the 24A, the 47 and the 36. The type 10 is also a good candidate—if you can find one.

If you are considering the middle and late thirties period, you'll have a much better selection of tubes to choose from. Some of the popular metal tubes of the era will make a fine VFO as long as one understands the idiosyncrasies of the type being considered. A few of the common ones are the 6K7, 6J7 and 6AG7. For the early post WWII period, the 6CL6 makes a fine oscillator and the same tube may also be used in the following isolation amplifiers.

Practical Variable Frequency Oscillators

Most of the variable frequency oscillators used by amateurs are designed around the Hartley oscillator circuit or the Colpitts oscillator circuit. Both systems are relatively simple to build if certain precautions are used. Construction of the unit must be rigid, heating problems must be addressed, the variable capacitor to be used for band spread tuning must be carefully chosen (sturdy units with good front and rear bearings are a must) and suitable tubes for the oscillator must be used.

A well-designed power supply is essential to help eliminate chirp. The circuits used in the VFO designs in this article utilize the basic Colpitts oscillator. Keying is accomplished by breaking the cathode return line. Best circuit design generally requires that the oscillator stage be followed by two isolation amplifier stages: an untuned first stage followed by a second stage tuned in the output. The primary objective of the isolation stages is to minimize interaction of the tuned amplifier stage with the oscillator.

A number of different tubes were tested for VFO application in the course of this study. These included the 24A, 36, 6AG7, 6SK7, 6J7 and 6CL6. A single-stage oscillator was constructed for the purpose of testing the various tubes. Keying in the oscillator was done by interrupting the cathode return. Before some of you bring up the long-standing idea that an oscillator cannot be keyed without introducing chirps, let me state categorically that it *can* be done if the plate voltage is carefully adjusted as discussed below. Plate/screen voltage for each tube was started at 300 volts using a Lambda variable regulated B supply. The voltage was gradually reduced while continuously keying and monitoring

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the signal quality on a receiver.

Interestingly, only the old 24A and the 36 tubes both produced fine chirp-free DC notes at 300 volts. As the plate/screen voltage was reduced, the 6AG7 and the 6CL6 tubes became chirp free at 150 volts. The 6K7 became chirp free at 125 volts and the 6J7 at 105 volts. Keying the screen of the above tubes did not completely cure the chirp problems at higher voltages. In view of the above findings it is prudent to use an appropriate voltage with a regulator tube; OB2 (108 volts) for the 6K7, VR90 (90 volts) for the 6J7, 0A2 (150 volts) for the 6AG7 and 6CL6.

Two different VFO circuits are illustrated, but there are a lot of variations and tubes that can be used depending on the whims of the builder. In Figure 1, a 36 Colpitts oscillator is followed by a 38 untuned isolation amplifier stage followed by a second 38 amplifier with a tuned output. The oscillator and first amplifier stages operate on 150 volts on the plate and screen. The second amplifier uses 300 volts on both plate and screen for an output of about 3 watts. The 36-38 combination uses 6.3 volt AC heaters, which is convenient when making up a power supply.

Figure 2 follows a circuit taken largely from the 1954 *ARRL Handbook*, pages 133-134. This circuit uses the 6AG7 oscillator in a series-tuned Colpitts circuit, sometimes called the Clapp oscillator. An untuned 6F6 isolation amplifier stage is followed by a second 6F6 amplifier with a tuned output. Output from this combination runs about 3 watts, which is sufficient to drive most preliminary amplifier stages in the transmitter.The 6AG7 tube is preferred over the 6SK7 or 6SJ7 because somewhat higher output is available. The 6AG7 tube can be run at 150 volts on the plate/screen.

36-38-38 VFO Construction

The 36 tube is used in a standard Colpitts oscillator circuit, operating in the 1.75-1.85 MHz frequency segment of the 160-meter band. A bandspread (main tuning) capacitor of 30-40 pF will provide easy coverage of the fundamental frequency range; multiplier stages can be used for higher-frequency bands. The bandspread capacitor chosen should have good bearings front and back.

My favorite capacitor is the old National DX unit, made in the late twenties for those three dial receivers. These capacitors turn up from time to time in the hamfests. They are a bit bulky by today's standards, but the mechanical features are quite favorable. They have a rigid frame con-

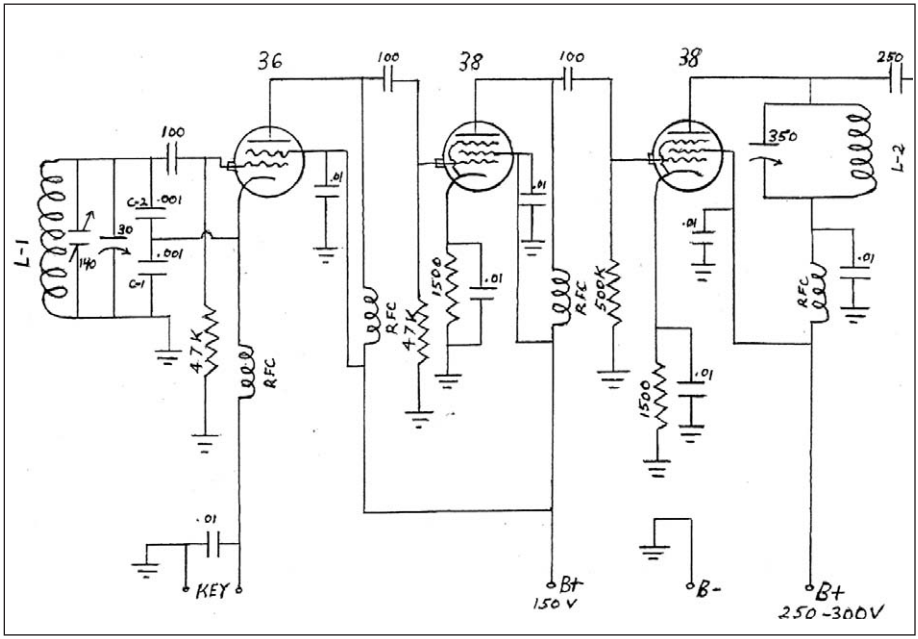

Fig. 1. Schematic for the "36-38-38" VFO. See text for L1 details. L2 is 39 turns of #18 enameled wire close-wound on 1⅝" form.

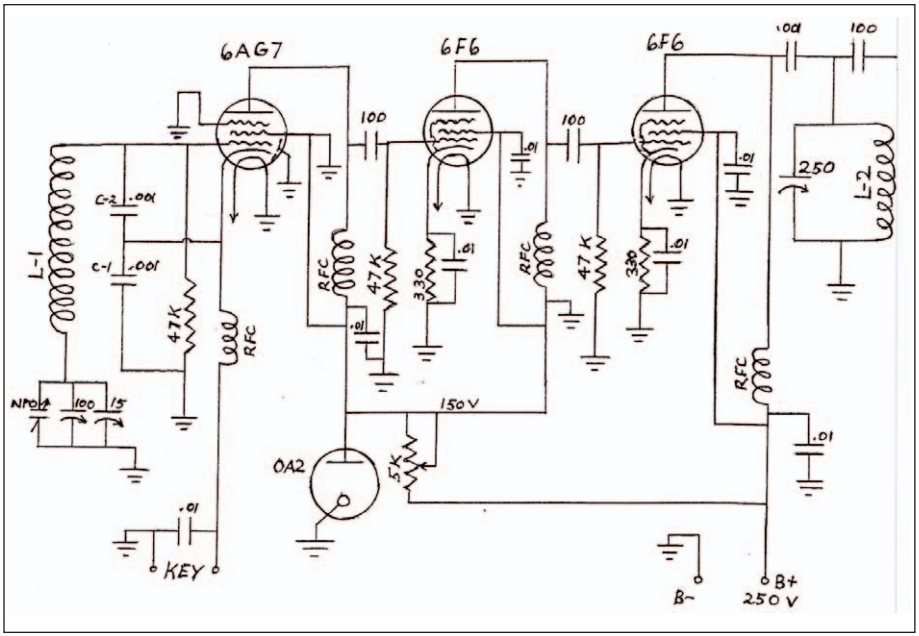

Fig. 2. Schematic for the "6AG7-6F6-6F6" VFO. See text for L1 details. L2 is 49 turns #24 enameled wire close-wound on 1"-diameter form.

struction, good shaft bearings, and best of all they can be totally dismantled and reconfigured to fit many uses.

The oscillator coil can be mounted directly on the back plate of the DX cap using two short mounting studs. A band set capacitor is required. This can be a small trimmer such as those made by Hammarlund. A value of 140 pF is desirable. The trimmer can also be mounted on the back plate of the DX cap. A small "L" shaped aluminum bracket can be made to hold it. The two .001 µF mica capacitors can be mounted across the bandspread capacitor. Handbooks recommend that dipped silvered micas be used for this purpose. The whole tuning assembly makes up into a rigid unit (Figure 3).

Instead of the National DX capacitor, you could use one of the small receiver-type variables having front and back bearings made by Hammarlund or Bud. In that case, it is suggested that the components of the tuner unit be mounted in a small aluminum box. This will provide both rigidity and shielding. A 4"×5"×3" box will work nicely and accommodate the bandspread (main tuning) and band spread capacitors, tuning coil and the two micas.

The chassis for the 36-38 VFO can be a simple 13"×7" breadboard with a panel (Figure 4). The panel can be a 7½"×14½" piece of ¼" birch plywood. This can be sprayed with glossy black paint, which makes a good imitation for bakelite. Fasten 4"×4" pieces of thin aluminum sheet to the back of the panel behind the oscillator and output tank variables. These will help minimize hand capacity effect. Be sure to ground these two sheets with leads to the ground bus (a straight length of #12 or #14 copper wire to which all component grounds are tied.)

Some type of vernier dial drive will be needed for the bandspread capacitor. The old National type A or type N dials are perfect for this purpose. A unit built up around the 36-38-38 combination will make a first-rate VFO in the 160 meter band.The VFO can drive amplifier-doublers to cover the 80, 40 or 20 meter bands if desired.

Power the VFO with 150 volts on the plate/screen for the oscillator and first isolation stage. Tube heating will be very low and drift will be inconsequential after 10 minutes warm up. Use 250 to 300 volts for the second isolation stage. Output will be about 3 watts, sufficient to drive a transmitter.

6AG7-6F6-6F6 VFO Construction

A fine VFO can be constructed using the above tubes if a more modern circuit is desired.

By the middle-late thirties metal tubes were all the rage. The basic oscillator circuit for this VFO is taken from the 1954 *ARRL Handbook*. A 6AG7 oscillator is followed by an untuned 6F6 isolation amplifier and then a second 6F6 amplifier stage tuned in the output. This oscillator stage employs a series-tuned Colpitts circuit covering the 1.75-1.85 MHz segment of the 160 meter band. The output amplifier may be tuned for the 160 meter band or the 80 meter band.

This VFO and its power supply are assembled on one chassis fabricated from heavy gauge aluminum. Chassis and panel dimensions were dictated primarily by the size of the power transformer and two filter chokes. The chassis is 10¼"×6⅜"×2⅛" made from 40 gauge sheet aluminum with a deck made of ⅛"-thick aluminum. The front panel, made of ⅛" aluminum, is 11¼"×7". Two side panels are made from 40 ga. aluminum 6⅜" wide × 6⅜" high; see Fig. 5.

The components of the tuner unit (bandspread cap, band set cap, tuning coil and mica caps) are housed in a shield box 4½" high, 4¾" wide and 4" deep. The entire chassis/panel assembly is tied together with ½"×½" aluminum angle. This makes a stiff chassis and panel suitable for a VFO.

Some type of vernier dial is recommended to drive the bandspread capacitor for smooth tuning. The old National Type A dial, the National Type N dial or the National type ACN dials will work nicely if you can find them at a hamfest. If all else fails a straight drive dial will work.

The 0-50 milliammeter shown in the photograph is an extra. Nice to help tune the output of the VFO but not essential. The output tank is located underneath the chassis deck. The two chokes in the power supply should be selected for low internal resistance—under 150 ohms is best.

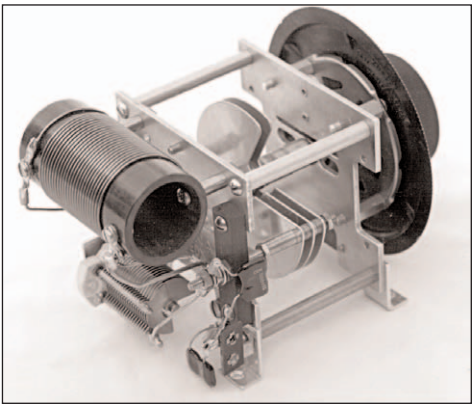

Fig. 3. 160-meter tuning unit using National DX type tuning capacitor. Tuning coil, bandset trimmer cap and silver mica padder capacitors are all mounted on frame.

An 0A2 regulator should be used to maintain a plate/screen voltage of 150 volts for the 6AG7 oscillator tube. See the earlier discussion for regulator tubes appropriate for other oscillator tubes. It is essential to use a regulator to assure a chirp free signal. The tuned amplifier stage can be run at 250 to 300 volts. Power output will be 3 to 4 watts.

Oscillator Tuning Unit Details

Band spread capacitor:
National DX variable reconfigured to 2 plates stator, 3 plates rotor, all double spaced. Alternative can be a Hammarlund 35 pF receiver cap, double bearings.

Band set capacitor:
Midget trimmer 140 pF

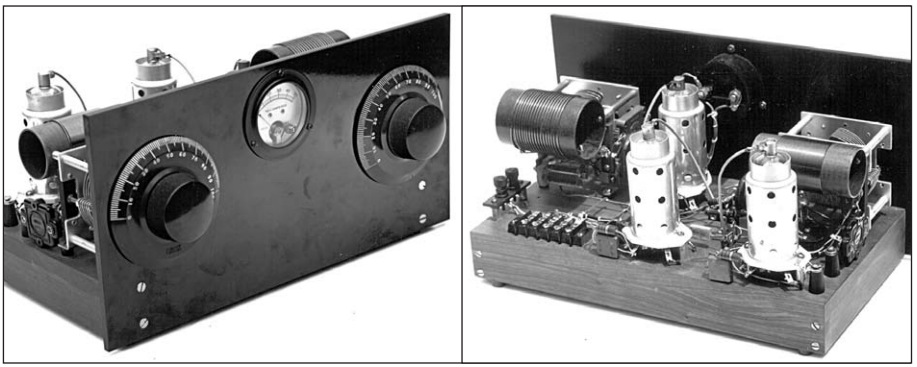

Fig. 4.Front and back views of the 36-38-38 VFO.

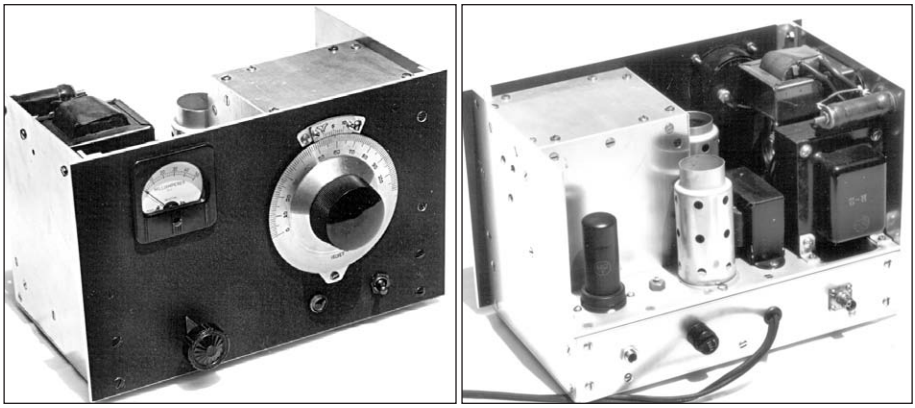

Fig. 5. Front and back views of the 6AG7-6F6-6F6 VFO.

Coils:

For the 6AG7 osc. series-tuned Colpitts circuit (1.75-1.85 MHz), 68 turns #30 enamel close-wound on a 1"-dia. form.

For the 36 osc. Colpitts circuit (1.75- 1.85 MHz), 25 turns #18 enamel space-wound with fine string on a 1⅝" dia. form.

80 Meter Alternative (3.5-3.8MHz) for the 36 osc. Colpitts circuit, 12 turns #18 enamel spaced 1" on a 1⅜" form. The silver mica padders should be changed: C-1 = 510 pF, C-2 = 1600 pF.

Power Supply Considerations

The power supply configurations for the 36 and 6AG7 oscillators use different voltage regulation methods. In both cases the power transformer should have a high voltage winding of about 350 to 375 volts each side of center tap and a current rating of 100 to 125 milliamperes. Two filter chokes are required. The internal resistance of each choke should be no more than 150 ohms, preferably less. Don't use 200-300 ohm chokes. If you do, the changing load across the chokes during keying will preclude good regulation. A heavy bleeder load is essential in both cases. Use a bleeder of 10,000 ohms and 50 watt rating. This load can be expected to drop the filtered voltage 80 to 90 volts.

With the 36-38-38 VFO, the plate/screen voltage of 150 volts is taken from a sliding tap on the bleeder resistor. This voltage operates the 36 and the first 38 (isolation) amplifier. The second 38 amplifier operates at 295-300 volts from the same power supply. Total current, key down, is 33 Ma. The total voltage drop is only 5 volts—less than 2%. This is a very acceptable regulation. A gaseous regulator tube is not needed if good components are used in the power supply.

The power supply for the 6AG7-6F6-6F6 VFO operates from a single DC source providing 275-300 volts. An 0A2 voltage regulator tube provides the 150 volts for the plate and screen of the 6AG7 oscillator and also for the first 6F6 isolation amplifier. The second 6F6 isolation amplifier operates on 250-300 volts.

Final Tests and Operation

The first order of testing is to ascertain that the oscillator tube has 150 volts on the plate and screen. If a voltage regulator tube is used, then adjust the resistance across the regulator. The tube should just remain lighted when the key is depressed.

Remove both amplifier tubes for the first test and switch on your receiver. The receiver should be tuned to 1.75 MHz if the oscillator tuned circuit has been built for the 160 meter band. Set the bandspread capacitor initially about ¼ open. Key the oscillator and adjust the band set capacitor until a strong signal is heard in the receiver. It should be a clean DC note and there should be no sign of keying chirp. Confirm that a strong second harmonic signal can be heard on 3.5 MHz.

Install the two amplifier tubes and resonate the output tank. This may be checked by coupling the output to the grid of the first stage of your transmitter and tuning for maximum power in the transmitter stage. Alternatively hook up a temporary 50 mA meter in the final plate B+ and then tune for minimum.

Either of the circuits shown in the article should work very well through doubler stages to cover the 80,40, and 20 meter bands. Good luck and I hope to hear one of these circuits during the contests next year. If I can be of any help, please write or call.

BY BILL FIZETTE, W2DGB

A Structured Approach to Fixing up Those Nice Old Radios

Taking Stock of Where We've Been

The first column in this series was published in the February, 2000 *OTB*. Since then we have discussed the beginning steps for someone who wants to get involved in this interesting facet of our hobby. We then progressed to some actual restorations.

At this point, I'd like to review in detail some of the points we have explored, if for no other reason than to bring new readers into the picture. We started out by discussing various reference sources you will need, and then progressed to work area, tools, and restoration philosophy. The concept of the "elmer" was also introduced: i.e., getting help and learning experience from an experienced person.

In the August, 2000 issue, we introduced some test instruments: the VTVM and the capacitor checker.

Since writing that column, which was based on the idea of purchasing and rehabbing test gear at hamfests, I have run into a few used Heath VTVMs which were not in good enough shape to repair. Perhaps a first-time restorer should purchase a new analog meter from a reputable source. They are not that expensive. Your measurements are important as you repair radios, and a questionable test meter is a definite liability.

In the February, 2001 issue, we discussed capacitors and resistors, and the need to check them carefully. The degrading of these items in an old radio chassis appears to be a function not only of age and the original materials used, but also of how the radio was stored. Moisture is bad, a long-term dry storage area is good. I refer you to the Communication Receiver column in this issue, where Jim Hanlon tells how some 50-year old bypass capacitors were still working.

In May 2001 we discussed the repair of an AC-DC radio, the National SW-54. In the process the various questions you should ask before starting work were listed. Safety considerations, critical with AC-DC circuits, were explored. Repair of components which are no longer available as replacement parts was discussed. In that vein, I noted that I have successfully used WD-40 to rework volume controls. Since then, in talking with other restorers, it seems that many have moved away from using WD-40 for this purpose, and instead use contact cleaner or a preparation called DeOxit.

In the November 2001 column we again discussed obtaining parts, and illustrated this with a little RCA Victor personal portable. In the February 2002 column we did a considerable amount of work and covered a number of topics as we restored a 1938 National NC-44 multiband receiver. In the May and August issues we explored and repaired a pre-WWII Meissner kit receiver, again using the basics which had been previously discussed.

During these discussions, I noted that simply identifying and replacing bad components, notably capacitors and resistors, will often lead to a working radio. But there are times when a lurking intermittant, or other unique problem, will frustrate even an experienced restorer. Radios have personalities, and certain makes and models were noted for being difficult. There are ways you can resolve many of these problems without seeking outside help, and as time goes on we will try to present these, a bit at a time.

This column has now entered a new phase. In each issue from now on I will concentrate on showing how I repaired a specific radio. On my list is a Zenith Model 7S-258, the famous "Walton's radio." Next is a mid-1930s Warwick 3-band tombstone. Next will be a little AC-DC set, an Emerson BA201 which I recall our family purchasing during the depression. The last item on my current list is a 1930s Atwater Kent cathedral—a Model 82.

These items will occupy at least another year, but in the meantime we are still looking for someone to take over this column. Surely there must be someone out there who has done a lot more of this than I have, and is willing to share knowledge and help beginners get started. It is vitally important that we bring newcomers into the hobby, and this is one important aspect. My contact information is shown with this column and I hope that someone will come forth.

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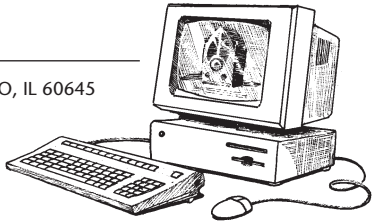

Communications Magazines on the Web

Thinking about all the different aspects of our communications heritage, I thought I'd touch on resources for the listeners, be they casual shortwave enthusiasts, hard-core amateur operators, or anyone in between. There have been many paper versions of magazines published since radio began. The early ones dealt with actual construction of crystal and TRF sets ands progressed from there as the radio industry matured.

Now that the RF spectrum is literally saturated with communications, I thought I should offer what I believe to be a good representation of (1) some old favorite publications (2) more recent publications that with have augmented their paper versions with additional web presence and (3) online-only magazines (popularly called E-zines).

***Shortwave Magazine* Homepage**
http://www.pwpublishing.ltd.uk/swm/
The UK's foremost radio listeners' magazine. It caters to the whole spectrum of radio monitoring interests.

QST
www.arrl.org/qst/
QST is the monthly journal for members of the American Radio Relay league, an organization for radio amateurs and those interested in amateur radio.

Monitoring Times
www.grove-ent.com/hmpgmt.html
Monitoring Times magazine covers shortwave broadcasting, scanner listening; military, maritime, and aviation monitoring; receiver reviews; antique restoration (by our own Marc Ellis!) and much more. You can also subscribe to an online version.

Popular Communications Magazine
www.popular-communications.com/
Articles on scanning and monitoring, frequency lists, logs, and CB for radio hobbyists.

VHF Communications Magazine
www.vhfcomm.co.uk/
Construction-oriented quarterly publication featuring VHF, UHF, and microwave.

CQ Magazine
www.cq-amateur-radio.com/
News and articles pertaining to ham radio. Includes links related sites and forums.

The DX Magazine
www.dxpub.com/dx_mag.html
The DX Magazine is published bi-monthly, online, with interesting stories of DXpeditions that have taken place. The magazine is currently in its 13th year of publication.

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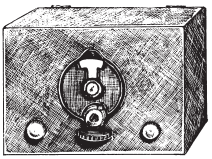
PLEASE INCLUDE SASE FOR REPLY.



Upcoming Events

Fall is in the air and it is time to dust off those old relics and make sure they will run. Also, for those procrastinators, it's time to get going and start that new old-time radio project for the winter QSO season. For the newcomers, I again make the offer to help you out with parts or by making the necessary coils for your project. As with every year, I hope for a good turnout, good weather, and no QRM!

Rules and dates/times for the winter tests are listed below. Logs and information sheets will be sent out about 10 days before each event. My listings pertain only to the Bruce Kelley 1929 QSO Party and the Linc Cundall Memorial Old-Time CW Contest. But keep reading after my announcements, and you'll see Randy Haus' announcement of a new "30s Night" contest that he and Marc Ellis, our *OTB* Editor, are trying out in March. Then watch for the February issue of *The OTB* for the information Randy will post about the Linc Cundall DX contest later in the spring.

Bruce Kelley 1929 Memorial QSO Party

This year, the Bruce Kelley 1929 QSO Party is scheduled for the first week in December.Take care to note that the first weekend activity will actually start on Saturday, November 30, with the second activity session starting on Saturday, December 7. Participants are urged to send in their logs early. I have to meet the end-of-December deadline set by our editor.

• *Dates and Times:* November 30 - December 1 and December 7-8. Start 2300Z (6:00 p.m. EST) and finish at 2300Z (6:00 p.m. EST), both periods.

• *Objective:* Contact as many other AWA members as possible. On contact, exchange RST, name, QTH (state), type of transmitter, year and power. Note the addition of your QTH (state) new this year.

• *Rules:* Transmitters must be 1929 or earlier types of self-oscillators, such as the Hartley, TNT, PP tuned grid tuned plate, MOPA etc. Participants are encouraged, but not required to use straight keys.

• *Power:* Transmitters are limited to a power input of 10 watts or less. However, between the hours of 0500Z (12 p.m. EST) and 1300Z (8 a.m. EST), power may be increased to 20 watts to help make E-W contacts.

• *Frequencies:* Operate for this '29 QSO Party will be between 3550 KC and 3580 KC.

• *Logs:* Send all logs to John F. Rollins, 21 Bald Head Rd., Arrowsic, Maine 04530.

Linc Cundall Memorial Old-Time CW Contest

The annual Old-Time CW Contest will be held during the last week in January, and the equipment will be anything from 1946 or earlier.

• *Dates and Times:* Jan 22-23. Start at 6 p.m. EST (2300Z) on Wednesday, January 22 and end at 6 p.m. EST (2300Z) on Thursday, January 23. Repeat on January 25 and 26.

• *Objective:* Contact the greatest number of AWA members. When calling, use (for example) "AWA AWA de W2AN". On contact, exchange signal report, year of equipment, such as "TX 36" for a 1936 transmitter and "RX 34" for a 1934 receiver. Send "MOD" for modern (after 1946) gear.

• *Rules:* A station will be scored only once on each band. Non-member contacts, and stations not submitting logs, will not count.

• *Frequencies:* 1800-1820, 3550-3580, 7030-7050, and 14060-14070 kHz +/- QRM. Concentrate 20 and 160 meter contacts on the hour.

• *Scoring:* QSO Zones: "E" eastern zone US Districts 1,2,3,4,8,9 plus VE1 VE2, & VE3; "W" western zone, US Districts 5,6,7,0 plus VE4, VE5, VE6 & VE7. "DX" zone: All others.

• *QSO Points per Contact by Zone:* "E" to "E" or "W" to "W" 1 point; "E" to "W" or "W" to "E" 2 points; "E", "W" or "DX" to "DX" 3 points.

• *Equipment Multipliers:* MOD TX *and* RX=1; OT TX *or* RX=2; OT TX *and* RX 3.

• *Power Multipliers:* input to final up to 4.9 watts=4; 5-24.9 watts=3; 25-100 watts=2; 100+ watts=1.

• *Determining Total Points per QSO:* (1) Find QSO Points for contact. (2) QSO Points X your equipment multiplier × your power multiplier =

total points for the contact.

• *Scoring Examples:* **Example 1**, KB2PLW contacts WlFPZ; (a) both are in "E" zone for one QSO point; (b) both have OT TX and RX for a 3 multiplier; (c) both are operating at 10 watts for a 3 multiplier. Therefore the contact is worth 1 pt × 3 × 3 = 9 points for the contact for each operator. **Example 2,** W6TDP contacts W2FCH; (a) "W" to "E" contact counts as 2 QSO points; (b) W6TDP has OT RX and OT TX running 20 watts; (c) W2FCH has MOD RX and OT TX running 50 watts. Therefore the contact is worth 2 × 3 × 3 = 18 points for W6TDP and 2 × 2 × 2 = 8 points for W2ER.

• *Logs:* Send all January OT Contest log results to John F. Rollins, WlFPZ, 21 Bald Head Rd., Arrowsic, Maine 04530.

Announcing "30s Night" A Brand-New Contest!

By Randy Haus

Marc Ellis, Our *OTB* Editor, brought the idea for this contest to the Amateur Radio meeting at the Annual Conference. He had noticed that while many construction articles on replica 20s ham equipment had appeared in *The OTB*, there were very few featuring 1930s circuits and construction practices. The equipment of this era has a distinctive look all its own, and the more sophisticated technology offers additional outlets for the designer and constructor. He felt that there would probably be more 30s projects in *The OTB* if there were a formal opportunity to use and enjoy the gear. Hence the idea for "30s Night" was born.

Many members at the meeting expressed an interest in participating in such an event, and I thought it was a good enough idea to try out. Not being an active amateur, Marc left the crafting of the contest rules to me—but he offered to do his part by receiving the completed logs and compiling the contest report that would later appear in *The OTB*'s Amateur Radio column.

In the rules that follow, you'll see a strong resemblance to those for the Linc Cundall DX contest I offer in April. One interesting difference is that AM operation is allowed on 30s night—the first use of the mode in any AWA contest or QSO Party. The contest will take place on 80 meters, and I've chosen to locate CW operation within the "CW Only" Novice subband. This window has been virtually abandoned except for a few VE ops who work 3700-3706 and some oddballs like me who still (with dwindling success) hunt for slower ops who need a friendly contact. We are in danger of losing the band if it is not better utilized. QRM will certainly be minimal.

Another departure is that we are offering this contest in "sprint" format. No need to commit two days each of two week-ends. This will be an intense experience that will take place over a five-hour period in a single evening. A study of the rules with show that, while MOD operation is allowed, we'd like you to leave your 20s equipment on the shelf for other contests. We want to encourage more building and designing of 30s gear. The formal rules follow, so let's try it out and see what happens! If we get good participation this will probably become a regular event.

"30s Night" Rules

• *Dates and Times*: 2300UTC Thursday to 0400UTC Friday (March 13th -14th, 2003). Although there is a date change in UTC, the sprint runs only from 6PM to 11PM EST on March 13th, 2002.

• *Objective*: Contact the greatest number of AWA members. When calling, use "AWA AWA AWA de KB2PLW" as an example. Once contact is made, exchange RST, name and year of equipment such as "TX 35" for a 1935 transmitter and "RX 38" for a 1938 receiver. Send "MOD" for gear or circuits built or designed after December 31st, 1939.

• *Rules*: A station will be scored only once in each mode. *Mode A* AM station to AM station — 2 points per contact for each operator; *Mode B* AM station to CW station —4 points per contact for each operator; *Mode C* CW station to CW station —2 points per contact for each operator.

To minimize receiver retuning, concentrate on Mode B (Cross mode contacts) from 0300 to 0400 UTC (10PM to 11PM EST). Non-member contacts and stations not submitting logs will not count.

• *Frequencies*: CW 3705 kHz to 3725 kHz ; AM 3875 kHz to 3895 kHz ; +/- QRM

• *Scoring*: QSO Zones: "E" eastern zone, US Districts 1, 2, 3, 4, 8, 9, plus VE1, VE2, VE3; "W" western zone, US Districts 5, 6, 7, 0 plus VE4, VE5, VE6 and VE7; "DX" zone, all others.

QSO points per contact by zone: "E" to "E" or "W" to "W": 1 point; "E" to "W" or "W" to "E": 2 points; "E," "W," or "DX" to "DX": 3 points.

• *Equipment Multipliers*: Mod TX and RX 1940 or later 1 point; 1930-1939 TX or RX (OT) 2 points; 1930-1939 TX and RX (OT); 3 points. Pre 1930s gear not eligible. Save it for the 1929 QSO party!

• *Power multipliers (input to final)*: 0-4.9

(continued on page 48)

NEW BOOKS AND LITERATURE

DAVID W. KRAEUTER, 506 E. WHEELING ST., WASHINGTON, PA 15301 E-MAIL KRAEUTER@SGI.NET
PLEASE INCLUDE SASE FOR REPLY.

Books to be reviewed in this column should be sent directly to David Kraeuter at the address above. After review, all such books become a permanent part of The AWA Library, which is part of The AWA Electronic Communication Museum and is available to members for browsing and research.

Experimental Researches in Electricity
By Michael Faraday. Published 1839-1855. Reprinted in 2000 in three volumes by Green Lion Press, 1-877-636-8616. $120.00 [Not seen by reviewer].

Modern facsimile reprints of out-of-print science classics are always welcome. Though the findings reported in these volumes have long since been absorbed into the literature of science and included in countless textbooks, historians of science in particular will be happy with this opportunity to delve into Faraday's writings just as he put them down in mid nineteenth century.

♦ ♦ ♦ ♦

Faraday's Experimental Researches in Electricity: Guide to a First Reading
By Michael Faraday and Howard Fisher. Published 2001 by Green Lion Press. 7 by 10 inches, 617 pages, softcover, $59.00.

If 1,500 pages in three volumes of original Faraday is a little more than you might need, Howard Fisher presents a workable compromise with this volume. Fisher has studied Faraday "in both laboratory and library" for over 25 years. Here he selects for reprint about a third of the items from the work above. About a fourth of this volume consists of Fisher's own insightful and thoroughly informed commentary on Faraday's text.

♦ ♦ ♦ ♦

The Chemical History of a Candle
By Michael Faraday. Published 1861, out of print. Reprinted in 1978 by Cherokee Publishing Company, 1-800-653-3952. 192 pages, $14.95.

This classic Faraday essay introduced young people to science through his ingenious examination of the actions of a simple burning candle. It has nothing to do with radio but will be of interest to anyone having a technical bent. This is how all science should be written, though for many practical reasons it cannot be.

Listen to Faraday in a lecture-demonstration to youngsters 100 years before the invention of OSHA:

"Here is a little gunpowder. You know that gunpowder burns with flame—we may fairly call it flame. It contains carbon and other materials, which all together cause it to burn with a flame. And here is some pulverised iron, or iron-filings. Now, I purpose burning these two things together. (Before I go into these experiments, let me hope that none of you, by trying to repeat them, for fun's sake, will do any harm. These things may all be very properly used if you take care; but without that, much mischief will be done.)"

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Radio Man: The Remarkable Rise and Fall of C. O. Stanley
By Mark Frankland. (IEE History of Technology Series 30). Published 2002 by Institution of Electrical Engineers, Michael Faraday House, Six Hills Way, Stevanage, Herts. SG1 2AY, UK. Email sales@iee.org.uk. 6 1/4 by 9 1/2 inches, 356 pages, hardcover. $39.00.

Here is a thorough biography of Charles Orr Stanley; it is also part of the story of the radio and electronics business and industry in 20th century Britain. As a young, self-made advertising executive, Stanley, who knew next to nothing about radio, decided in 1928 to buy Pye (pronounced *pie*), a small radio and instrument manufacturer. The way Stanley closed the deal says much about him and the future of his career. On the day of the sale, he carefully waited until after the banks closed before he handed over his check. This gave him the rest of the day to search for financing so the check wouldn't bounce.

Stanley's daring and freewheeling (Americans might say *off the wall*) business and management style frustrated some of his employees but it fostered considerable creativity in others. By 1965 Pye was a conglomerate of 109 companies, including 39 based outside Britain. Among their many products were radar equipment and the proximity fuse, developed early in WW II. Britain struggled to produce a few hundred such fuses per week. Against Stanley's wishes, technology for this device was "exported" to the US;

by the end of the War the US had manufactured 150 million fuses. Pye also produced the famous No. 19 military radio, used worldwide, and made Britain's first portable transistor radio in 1956. Stanley also became one of the main players in breaking the BBC's broadcasting monopoly.

It's interesting to try to find American counterparts to Stanley's life and companies.

His brashness in buying Pye reminds one of Zworykin's cheek in building his house. When the owner of the land on which Zworykin wished to build refused to sell, Zworykin simply went ahead with construction. Eventually the owner agreed to sell. There are obvious parallels between Stanley's bossiness (he could tolerate no rivals in his companies) and Sarnoff and RCA. Pye's chronically being strapped for cash, however, is paralleled by almost any US radio firm *but* Sarnoff's. And it's easy to find US parallels to Pye's weak, sloppy or devious accounting practices. Just watch today's business news. But neither the intent nor the result of "cooking the books" by current US companies was ever duplicated by Pye. Stanley was a salesman first of all; accounting took a back seat. In the extreme, some Pye companies simply had no books to cook.

Some of Stanley's characteristics which made Pye successful also helped cause the spectacular crash of his career in 1966. This episode was so precipitous and so traumatized Stanley and his son John that Frankland begins his book with a chapter describing it. The chapter is titled "The Execution".

Every IEE History of Technology Series book reported on here so far has been beautifully and intelligently written; this one is no exception.

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Following are some books of lasting interest originally reviewed by the author in The Pittsburgh Oscillator*, newsletter of the Pittsburgh Antique Radio Society. See end of each review for original publication date.*

Basic Radio Course

By John T. Frye. Published 1951, revised editions 1961 and 1974, out of print. Available through bookfinder.com. 224 pages (1961 edition).

So, you're new to the hobby and you want to know how old radios work. Here is a good place to find out. After reading this book you might want to move on to Frye's *Radio Receiver Repair*, reviewed below.

In relatively non-technical language—and with almost no math—Frye explains how each stage of a tube-type radio works. Despite the unfortunate error on page 16 of the 1961 revised edition which has amperes equal to ohms divided by volts, the explanations are fairly easy to understand for those willing to take the time to think about them. Frye takes a somewhat unusual approach in that he starts at the radio speaker and works backward to the antenna.

If the author's name sounds familiar it may be because he was the creator of "Carl and Jerry," the engaging radio boys series that appeared in *Popular Electronics* in the 50s and 60s. He also wrote the "Mac's Service Shop" column for *Radio & Television News*. Some of his hundreds of articles were translated into Spanish, Portuguese, Japanese and Hindustani. He was born in 1910 and began servicing radios in the late 20s.

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Radio Receiver Repair

By John T. Frye. Published 1959 (second edition), out of print. Available through bookfinder.com. 222 pages.

Frye's repair book is highly recommended to those who have basic electronics knowledge and want to try repairing their own antique radios. Written in the mid 50s, it emphasizes transformer sets, AC/DC table sets and ac/dc/battery portables. Separate chapters cover auto radios, all-wave sets, and frequency modulation. A chapter was also added to this edition for those new transistor radios and printed circuits.

Frye has organized his book very conveniently by symptoms displayed by malfunctioning radios. Broadly, his book does for symptoms what the "Case Histories" section of Alfred Ghirardi's *Radio Troubleshooter's Handbook* does for individual radio models. Chapters in Frye's book include "The Dead Set, Tubes Light But No Sound, Only Slight Hum Is Heard, Only Noise Can Be Heard, Excessive Current Indication, Sets With Excessive Hum, Set Does Not Separate Stations, Sets That Whistle, Motorboat, Etc., Noisy Sets, Sets With Distortion, and Weak Sets." There are two chapters on intermittents.

The next time you get stuck while trying to fix an old radio or just don't know where to begin, flip this book open, match the radio's symptom to the appropriate chapter title, and start reading.

The Frye reviews were originally published in The Pittsburgh Oscillator, *Volume 17, Number 1, March 2002, page 14.*

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CK722 Classic Germanium Transistor Website

http://www.geocities.com/ck722transistor/

Some people are passionate about women. Others are passionate about men. Still others

(like us) are passionate about radios. Then we have those who are passionate about *parts* of radios. Enter Jack Ward, who has spent many hours researching the history of transistors — one in particular, the famous CK722 produced in the 50s and 60s by Raytheon.

Ward has just finished a 120-page book, *The Story of the CK722*. Visit the site above for details and many CK722 links, including contributions by those who were in on the design of the CK722. The book is available with two CDs, which provide supplemental material.

Ward's book includes a modern-day solid-state "Carl and Jerry" adventure, written by himself. We won't give the ending away, but, as you might expect, the CK722 plays a pivotal role.

I'd like to see all of John Frye's original Carl and Jerry adventures and Mac's Service Shop episodes reprinted in a single volume. Is anyone passionate about that idea?

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Communications Miracle: the Telecommunication Pioneers from Morse to the Information Superhighway

By John Bray. Plenum Publishing Corp, 233 Spring Street, New York, NY 10013-1578, Tel. 800-221-9369, 51/2 by 81/2 inches, 379 pages, hardcover. 1995. $28.95. Available from www.amazon.com.

Reading this book was a genuine pleasure. It is written in language that is always clear and generally concise, it is very well-organized, and the author, a British telecommunications engineer, witnessed firsthand many of the events and inventions he writes about.

In the introduction to the book Bray states: "The present-day world telecommunication network is the most complex, extensive and costly of mankind's technological creations and, it could well be claimed, the most useful." The pages that follow document this claim in detail, beginning with the creation of the mathematical foundations of radio by Volta, Ampere, Ohm, Faraday, etc., and continuing through a chapter on telecommunications and the future.

We get chapters on telegraphy, the telephone, radio, television, and microwave transmission, but my eye was caught by the fascinating details about such major engineering endeavors as the first successful transatlantic telegraph cable (completed before the American Civil War), the first transatlantic telephone cable (1956), and the first transatlantic optical fiber cable (1988).

The first telegraph cable provided no signal amplification, of course, and the distributed capacitance of the 2200-mile cable severely limited the speed at which messages could be sent. Nevertheless messages were exchanged between Queen Victoria and U.S. President Buchanan on August 14, 1858.

A century later the first telephone messages crossed the Atlantic by cable (actually two cables, one for each direction of transmission). Even though the transistor had been invented in the late 40s, these cables used tube amplification, with 146 repeaters (amplifiers) each using tubes designed to operate for 20 years without attention. Bray refers to the 1956 system as "the most outstanding engineering achievement in telecommunications during the first half of the 20th century." The cable provided 35 telephone circuits between London and North America. A mere 32 years later the world's first optical fiber transatlantic cable provided 40,000 circuits.

Transatlantic telephone cables with transistorized repeaters were not installed until the 1960s, and reliability standards for the transistors used were ultra-high. Bray states: "...typically there must be not more than one failure in 2000 transistors over a period of 25 years!" Transistors were tested for reliability using "accelerated aging tests" involving operation of the transistors at above-normal temperatures. (I have always objected to the name of this test, since all material always ages at exactly the same rate—24 hours a day—no matter what stresses it is subjected to, except maybe in black holes. Perhaps a better name would be accelerated stress test).

Bray finishes his book with "And Part of Which I Was," an essay written in the genre I call technobiography, i.e., biography as revealed through the technological innovations or experiences of an individual's life. Technobiography has been practiced simultaneously with the history of telecommunications, and includes the writings of de Forest, Fessenden, Fleming, Lodge and many others. These writers give us personal descriptions of radio history as it happened, made all the more interesting by being direct eyewitness and earwitness accounts.

Originally published in The Pittsburgh Oscillator, *Volume 14, Number 2, June 1999, p. 13.*

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Early Days of Radio Broadcasting

By George H. Douglas. Published 1987 by McFarland & Company. 248 pages, hardcover. $25.95. Out of print, available through http://www.bookfinder.com.

Douglas, born in 1934, did not live during most of the period being written about in this book; hence the flavor of first-hand experience is missing here. But this informal, sometimes anec-

dotal, history is well written and will be interesting to anyone who wants to know more about the early days of broadcasting.

book opens with a chapter titled "KDKA". This includes portraits of Marconi, Alexanderson, DeForest, the 16-year-old Sarnoff and Frank Conrad at his workbench. Two other chapters complete the early general history, and these are followed by chapters on specific aspects of the subject: the radio announcer, radio advertising, regulation, news, sportscasting, networks, educational stations, classical and popular music, and "Amos 'n' Andy"—each chapter being a well-researched essay on the topic. This approach enables the reader interested in a particular aspect of radio history to quickly locate relevant material in the book, but makes the book as a whole difficult to review. We will look at only two chapters here.

In the chapter on radio regulation, "The Wavelength Wars," Douglas relates the heavy-handed but necessary measures taken by Herbert Hoover, as Secretary of Commerce in Harding's administration, to impose some order onto the chaos of broadcasting in the mid 20s. His efforts were not altogether appreciated. As proof, Douglas quotes the following excerpt from a letter Hoover received from female evangelist Aimee Semple McPherson:

Please order your minions of Satan to leave my station alone. You cannot expect the almighty to abide by your wavelength nonsense. When I offer my prayers to Him I must fit into His wave reception. Open this station at once.

If you're too young to actually remember the "Amos 'n' Andy" show, you'll want to read that chapter in Douglas' book. Gosden and Correll created the first serialized sitcom on radio, "Sam 'n' Henry," and later, "Amos 'n' Andy," radio's first syndicated program. Douglas details the phenomenal success of this program in the early 30s, during which it is believed that a third of the population of the country tuned this program in.

"Drugstore proprietors refused to wait on customers while the program was in progress. Motion picture theatres installed radio loudspeakers in their lobbies, and sometimes stopped whatever picture was being shown so that their audiences could listen to the fifteen-minute show."

Douglas includes a robust 19-page bibliography in his book. The material in it is divided into bibliographic sources, books and articles, unpublished material, government publications, periodicals, and broadcast archives; most publications listed deal more or less with the 1920s and 1930s era.

Originally published in The Pittsburgh Oscillator, *Volume 2, Number 4, December, 1987, p. 4.*

AMATEUR RADIO, *continued from page 44*

watts 4 points; 5-24.9 watts 3 points; 25-100 watts 2 points; 100+ watts 1 point.

• *Determining total points per contact*: (1.) Find the Mode points and QSO points for the contact and add them together. This total is the number of contact points. (2.) Multiply your contact Points X your equipment multiplier X your power multiplier to get the total points for the exchange.

• *Scoring examples*: *Example 1*, W3VVS contacts W1FPZ (a) Both are on AM (Mode A) for 2 Mode points each. (b) Both are in the "E" zone for 1 QSO point each. (c) Add the 2 Mode points and 1 QSO point to get 3 Contact points. (d) Both have OT TX and RX for a 3 multiplier each. (e) Both are operating at 10 watts for a 3 multiplier each. (f) Multiply the 3 Contact points by the 3 equipment multiplier by the 3 power multiplier to get 27 points for each operator. *Example 2*, K6TQ on AM contacts N4AWA on CW (a) This crossmode (Mode B) contact earns 4 Mode points for each operator.(b) This "W" to "E" contact rates 2 QSO points for each operator. (c) Add the 4 Mode points and 2 QSO points to get 6 Contact points for each operator. (d) K6TQ has OT TX and RX for a 3 equipment multiplier; N4AWA has OT TX and MOD RX for a 2 equipment multiplier. (e) K6TQ was running 20 watts for a 3-point power multiplier; N4AWA was running 50 watts for a 2-point power multiplier. (f) KT6TQ's point score is 6 contact points times his 3 equipment multiplier times his 3 power multiplier = 54 points; N4AWA's point score is 6 contact points times his 2 equipment multiplier times his 2 power multiplier = 24 points.

• *Awards*: A plaque will be awarded to the person receiving the highest point score at the AWA Conference in September.

Log Mailing: Log sheets will be sent out to previous OT contest participants about three weeks prior to the event.

Log Returns: Since results will be reported in the May, 2003 issue of *The OTB*, returned logs must be postmarked no later than April 1 in order the be counted. NO EXCEPTIONS! Send your logs to Marc Ellis, Antique Wireless Association, P.O. Box 1306, Evanston, IL 60204-1306.

MICS AND MEN

EDITED BY **GEORGE A. FREEMAN**, 102 E. MAIN ST., MADISON, IN 47250-3411.
PHONE (812) 265-6878. E-MAIL RALOGEUM@AOL.COM. *PLEASE INCLUDE SASE FOR REPLY.*

The Mic: Western Electric 47-A
The Woman: Ruth Etting

An amazingly realistic mannequin of jazz-age singer Ruth Etting stands before a WE 47-A at the John Milton Williams Museum of Radio Broadcasting History.

The Western Electric 47-A is a condenser microphone. Developed in 1916 by E. C. Wente for Bell Labs, the condenser offered much less distortion than carbon type microphones. Condenser technology was used for Warren G. Harding's inauguration on March 4, 1921.

This microphone has been restored and is in a private museum collection (see below) where it stands before a mannequin of jazz- age singer, Ruth Etting. The bottle below it, as described in Bob Paquette's *The History and Evolution of the Microphone,* contains a pre-amplifier.

17-year-old Nebraskan Ruth Etting landed a job in Chicago designing costumes. She later became a chorus girl, then a vocalist. As "America's Radio Sweetheart," she was a regular performer on at least eight radio network programs. During the 1920s and 1930s, Etting recorded over 200 songs, appeared in six Broadway shows. and made three major full-length movies.

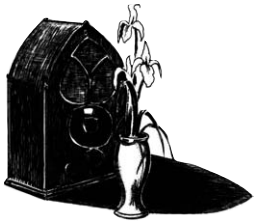
In 1938 Ruth's former agent/husband shot her accompanist/boy friend. The ensuing trial, a media circus, revealed that Ruth Etting's husband was connected to Chicago's mob. America's love affair with this "sweetheart" was over.

Today, new appreciation for Ruth Etting is being nurtured in northern Ohio by a late-in-life-friend of hers. He is physician Larry Kass. Larry and architect wife Sarah Kass are curators of the John Milton Williams Museum of Radio Broadcasting History, a treat for those who love radio nostalgia.

A comprehensive report on the museum was published in the July, 2002 issue of *Radio* and can be read at http://beradio.com/ar/radio_location_oldtime_radio/index.htm

For info regarding group museum tours, phone toll free: 877-590-4849 or email: skass@ prodigy.net.

RECENT RADIO, TV AND ENTERTAINER OBITUARIES



COMPILED BY **CHARLES S. GRIFFEN W1GYR**
1225 NEW BRITAIN AVE., WEST HARTFORD, CT 06110-2405

Note: When known, the date of death is indicated in parenthesis.

RAY BROWN, 75, jazz bassist. Brown expanded the boundaries of the upright bass during a career that spanned more than five decades. He played with such notables as Dizzy Gillespie, Charlie Parker, Oscar Peterson, and his one-time wife Ella Fitzgerald (1947-1952), and was featured on more than 2,000 recordings. Brown joined Gillespie's small group in 1945 and later his first big band. He recorded the classics *One Bass Hit* and *Two Bass Hit* with the band before forming his own group in 1948. Brown later performed with Norman Granz's *Jazz at the Philharmonic* tours and later the original Modern Jazz Quartet. He also played on all Frank Sinatra's television specials, was Director of the Monterey Jazz Festival for two years and the Music Director of the Concord Summer Festival in 1976 and 1977.

THOMAS R. BROWN, JR., 75, (6-6-02) electronics executive. Brown and Page Burr cofounded Burr-Brown Corp. in 1956 in Brown's garage with an investment of $50,000. The Tucson-based firm, a world leader in the development, manufacturing and marketing of precision linear, data conversion and mixed signal integrated circuits, was acquired by Texas Instruments in 2000 for stock valued at $7.6 billion. Brown was experimenting with electronics when Burr sent him a then-new transistor which he later applied to communications, computing, consumer and industrial applications. His engineering skill helped Burr-Brown to remain a leader in their industry.

JACK BUCK, 77, (6-18-02) sportscaster. Buck was the voice of the St. Louis Cardinals for nearly 50 years. He began broadcasting for the Cardinals on KMOX(AM) in 1954 with his partner Harry Caray. Buck spent the last 30 years teamed with Mike Shannon. He also worked in national radio serving as an announcer for Monday Night Football on CBS Radio and briefly left the Cardinals' broadcast booth to host an ill-fated NBC studio program called *Grandstand* in 1975. Buck began his career broadcasting minor-league baseball games for WCOL(AM) in Columbus, OH.

EMERSON LAIRD CAMPBELL, W1HQ, ex-WN5TQD (later W5TQD), W1CUT, 70, (4-26-02) radio magazine editor. Campbell was the Managing Editor of *QST*, the international publication of the American Radio Relay League, Inc., from 1978-1989. He joined the League's staff in 1954 as a contest log checker and over the next 35 years served in a variety of capacities including Technical Assistant, Assistant General Manager for Business Operations and Advertising Manager. In 1955 he was credited with making the first amateur radio contacts on 160 and 20 meters using transistorized transmitters.

ROSEMARY CLOONEY, 74, (6-29-02) singer. Clooney's warm and radiant voice made her one of America's most popular vocalists for more than half a century. She performed with big bands, made appearances on radio and television, starred in motion pictures and entertained in cabarets and on concert stages. Some of Clooney's hit recordings include *Come-on-a My House, Tenderly, Hey There, Half as Much* and *Beautiful Brown Eyes*. She and her sister, Betty, began singing together in Cincinnati on WLW's *Moon River show* in 1945. A year later they joined the Tony Pastor Band, but Betty quit in 1949 followed by Rosemary. In 1950 Rosemary signed a recording contract with Columbia Records and a year later recorded *Come-on-a My House* which sold over a million copies. Some of her television credits include appearances on *Arthur Godfrey's Talent Scouts* (CBS 1950), *Eddie Condon's Floor Show* (NBC 1949, CBS 1950) *The Lux Show Starring Rosemary Clooney* (NBC 1957-1958), *On Parade* (NBC 1964), *The Orchid Award* (ABC 1953) and *Songs for Sale* (CBS 1950-1951). She made her film debut in 1953 in *The Stars Are Singing* and appeared in five other films, including her most memorable one, *White Christmas,* with Bing Crosby, Danny Kaye and Vera-Ellen.

MATT DENNIS, 88, (6-21-02) vocalist and composer. Dennis appeared in television and films and recorded a number of albums, but will probably be best remembered for the songs he wrote. They include *Let's Get Away From It All,*

Angel Eyes, Everything Happens to Me, The Night We Called It a Day, and *Will You Still Be Mine*? In the early 1940s Dennis worked for Tommy Dorsey as an arranger and vocal coach. At the time Frank Sinatra was one of the vocalists with the Dorsey band. During WWII he played with Glenn Miller's *Army Air Force Band*. After the war he resumed his career and sang in nightclubs with his wife Virginia Maxey, who earlier had been a vocalist with the Tony Pastor Band.

JERRY DUNPHY, 80, (5-20-02) television news anchor. Dunphy was one of the most recognized faces on television news in Los Angeles. He anchored two weekday KCAL(TV) broadcasts as recently as the week before he died. Dunphy began his Channel 9 broadcasts with the lead in "From the desert to the sea to all of Southern California." His first anchor assignment was with KNXT(TV), now KCBS(TV), in 1960 with the groundbreaking *Big News* broadcast. Dunphy remained there for 15 years before joining KABC(TV) in 1975. In July 1989 he moved to KCAL(TV). During his career he was the first to interview President Richard M Nixon following the Watergate scandal. Dunphy also interviewed three other presidents, presidential candidates, and reported from many foreign locations. He began his TV career in 1953.

KENNY GARDNER, 89, (7-26-02) singer. Gardner was the featured vocalist with *Guy Lombardo and his Royal Canadians* for almost 30 years. He was hired by Guy in 1940 after Guy's sister, Elaine, whom Kenny later married, heard him singing on a radio program in Los Angeles. Gardner remained with the band until 1978. His signature hits were *Enjoy Yourself, It's Later Than You Think* and *Frankie and Johnny*. The Lombardo band provided "The Sweetest Music This Side of Heaven" to dancers in hotels and ballrooms across America, sold more than 100 million records and performed for every presidential inaugural from Franklin D. Roosevelt's in 1933 to Jimmy Carter's in 1977. Their New Year's Eve program, first on radio and later on TV, became a national institution.

DOLORES GRAY, 78, (6-26-02) singer and actress. Gray's career included performances on Broadway, London's West End and Hollywood musicals. Her first major success was playing the lead in *Annie Get Your Gun* in London in 1947. This led to Broadway where she starred in the musical *Carnival in Flanders* for which she won a Tony Award in 1954. It was here that she introduced the song hit, *Here's That Rainy Day*, which later became a standard. In 1955 Gray signed a contract with MGM and appeared in four films during the next three years. They were *Kismet* with Sebastian Cabot, Vic Damone and Ann Blyth; *It's Always Fair Weather* with Gene Kelly, Cyd Charisse and Dan Dailey; *The Opposite Sex* with June Allyson, Joan Collins and Ann Sheridan and *Designing Woman* with Gregory Peck, Lauren Bacall and Sam Levene. She began her career singing on the Rudy Vallee radio show when she was fifteen.

CHICK HEARN 85, (8-5-02) sportscaster. Hearn, who helped introduce the Lakers to Los Angeles fans when they moved from Minneapolis, was their radio and television voice from November 21, 1965 to December 16, 2001. In all, Hearn broadcast 3,338 consecutive games. He missed his first Laker broadcast in 36 years last December 20 when he underwent heart surgery. This was followed by hip-replacement surgery after a fall, but Hearn resumed broadcasting on April 9, 2002. He pioneered the simulcast—calling the play-by-play for both radio and television audiences—and coined such terms as "slam dunk," "airball" and "yo-yoing up and down." Hearn began his career with the Armed Forces Radio Service.

HOWARD RANDOLPH HOLDER, SR., 85, (5-6-02) broadcasting executive. Holder was President of Clarke Broadcasting Corp. from 1956 until 1990 and Chairman of the Board since 1990. He began his career in 1946 as an announcer for WOC(AM) in Davenport, IA and from 1948 until 1956 was the News Director and part owner of WFRC(AM) in Athens, GA. Holder was the President of the Georgia Association of Broadcasters in 1961 and was inducted into their Hall of Fame in 1993.

JOHN J. "JACK" KELLEHER, W4ZC, (2-28-02) communications engineer. Kelleher was the National Aeronautics and Space Administration's Project Manager for Operational Aspects of Experimental Communications Satellites. He was employed by the agency from 1962 to 1969 but continued to work in communication satellites, including National Science Labs, until 1991. Kelleher began his career as an Army radiotelegraph operator (1932-1937) and later worked for RCA Communications in New York City (1937-1940). In 1941 he moved to Washington to work in the signals detachment at the White House followed by duty in the military signals units in North Africa during WWII. From 1943 until 1962 he was a civilian project and program manager in the office of the Chief Signals Officer in the Department of the Army. Kelleher was President of the Quarter Century Wireless Association from 1996-1998.

KATY JURADO, 78, (7-5-02) actress. Mexi-

can-born Jurado is probably best remembered for her supporting role as Gary Cooper's one-time girlfriend in *High Noon*. She earned an Academy Award nomination for her 1954 supporting role as Spencer Tracy's Indian wife in the western *Broken Lance*. Jurado also acted alongside John Wayne, Marlon Brando, Clark Gable, Burt Lancaster and Elvis Presley. Jurado won three Ariels, Mexico's equivalent of an Oscar, including one for her performance in the 1952 film *El Bruto*. She appeared in a number of films here and in Mexico including *One-Eyed Jacks, Pat Garrett and Billy the Kid, Under the Volcano*, and *Nosotros Los Pobres*. Jurado began her acting career in 1943.

DAVID A. MANN, ex-K2AGZ, 85, (3-1-02) pianist and composer. Mann wrote more than fifty songs including such hits as *In the Wee Small Hours of the Morning, Don't Go to Strangers, Dearie, No Moon at All, Somebody Bad Stole the Wedding Bell* and *There I've Said it Again*. In 1939 he joined Decca Records in New York City, playing piano and arranging for artists during their recording sessions. Mann also played piano for bands fronted by Jimmy Dorsey, Artie Shaw and Charlie Spivak and vocalist Gordon MacRae. He appeared in a number of films including *Twenty Grand, I Dood It, Four Jills and a Jeep, Pin-Up Girl* and *Second Chorus* starring Fred Astaire, Burgess Meridith, Paulette Goddard and Artie Shaw's Orchestra. Mann composed the scores for the Disney Nature Series films, *The Living Desert, Water Birds* and *Seal Island*. He also appeared in a number of films with the Artie Shaw and Jimmy Dorsey bands while he was in the U.S. Army during WWII. Upon discharge in 1945 he became the personal pianist for President Harry S. Truman.

NED MARTIN, 78, (7-23-02) sportscaster. Martin was the radio and television voice of the Boston Red Sox for 32 years. He joined Curt Gowdy in the Red Sox broadcast booth in 1961 and remained there for the rest of his career. Martin was also a football announcer and did play-by-play broadcasts for Harvard, Dartmouth and Yale and the Boston Patriots. Following military service as a Marine in WWII he began his broadcasting career in 1956 covering minor league baseball in West Virginia.

JIMMY MAXWELL, 85, (7-20-02) jazz trumpeter. Maxwell was the lead trumpeter with many of the best-known big bands such as Benny Goodman, Count Basie and Woody Herman. Normally he shaped the sound of the trumpet sections, but occasionally did solo work. This was the case with Goodman's hit recording of *Why Don't You Do Right* in 1942 on which he played the obbligatos to Peggy Lee's vocals. Maxwell joined the CBS studio orchestra in 1943 and for the next 30 years worked in radio and television. He was also on the staff of NBC and performed with Perry Como, both on radio and TV, the NBC Symphony Orchestra and *The Tonight Show* band from 1960-1974. Maxwell began his career while he was in high school working with a local band led by the pianist and arranger Gil Evans.

LESLIE GRANT MIDGLEY, 87, (6-19-02) former CBS News producer. Midgley produced 1,500 programs for CBS News, including coverage of the Kennedy assassination, the events that immediately followed it and the fall of Saigon. He joined CBS News in 1954 when the division included such commentators as Charles Collingwood, Alexander Kendrick, Eric Sevareid and Walter Cronkite. Midgley produced programs for all of them and was Executive Producer of The Evening News with Walter Cronkite from 1967 to 1972. In 1980 he joined NBC News as Vice President for Special Programs but later left to become a teacher and consultant. He began his career as a cub reporter for *The Desert News* in Salt Lake City

HAL SIMMS, 83, (7-2-02) announcer. Simms was one of the most-heard announcers on CBS Television from the early 1950s until his retirement in 1992. His voice was heard on *Beat the Clock*, *The Guiding Light*, and *The Frank Sinatra Show*. Simms was frequently heard saying "CBS presents this program in color." He also provided coverage for news and sports reports. Simms worked at CBS affiliates in New England and Philadelphia before moving to New York City

ROD STEIGER, 77, (7-9-02) actor. Steiger enjoyed demanding roles, especially those involving real-life persons. Samplings of them include Mussolini, Rasputin, Pope John XXIII, Rudolf Hess, Pontius Pilate, W.C. Fields and Al Capone. A prolific actor, Steiger often made three or four films a year. Some of his film credits include *Al Capone, Seven Thieves, The Loved One, Doctor Zhivago, On the Waterfront, In the Heat of the Night, The Pawnbroker* and *The Amityville Horror*. Steiger won an Oscar in 1967 for his role as the redneck Southern police chief in *In the Heat of the Night*. Between 1947 and 1953 he appeared in 250 television dramas including, *Danger* (CBS), *Goodyear TV Playhouse* (NBC), *Kraft Television Theatre* (NBC), *Philco TV Playhouse* (NBC) and *Sure as Fate* (CBS). He attended drama school in New York City on his $75 per month grant from the G.I. Bill of Rights and made his film debut in 1951 in *Teresa*.

RADIO REPRODUCERS

EDITED BY **DAVE CROCKER**, 35 SANTUIT POND RD., #4B, MASHPEE, MA 02649
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The Borkman "Jewel Case" Speaker

The Borkman Radio Corporation of Salt Lake City, Utah boasted that its "Velvet" speaker Mode l21, called the "Jewel Case," had the beautiful tone of an ancient violin. This horn-type speaker of 1925/26 came in a hollow, domed, all-wood cabinet. It measured a full 16 1/2" wide by 11 1/4" deep by 13" tall in the fully open position.

The top of the case was hinged at the back to allow the front to open as wide as the operator wanted to make volume adjustments. The driver on the pictured model is marked "Borkman Type M25-S." However, no doubt because the Borkman factory was located in Salt Lake City, many speakers were fitted with "Utah" brand reproducers.

The Jewel Case is essentially a large-sized tone box, or sound chamber. Due to repeated use over the years, the top on my unit is loose and won't stay in the open position very long. A note of warning—if your top is loose do not use any kind of tape to hold it up. The finish is quite thin and will peel off with the tape.

Borkman continued into the 1926/27 model year with cone-type speakers such as the Velvet Model 18 and "Chinese Cone-Flex." The Jewel Case drifted into obscurity—that is, until 1934, when the Reliable Radio Co. of New York offered their "Treasure Chest" radio in the very same Borkman speaker cabinet. Amazingly enough, the Jewel Case speaker originally sold for $45 in 1925/26, but the Reliable Treasure Chest radio sold for a mere $9.50 (minus its tubes) eight years later.

The Borkman Model 21 "Jewel Case" horn speaker shown in open position.

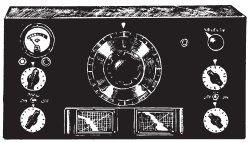
The Reliable "Treasure Chest" radio of 1934 from "Guide to Old Radios, Pointers, Pictures and Prices" by David and Betty Johnson, Krause Publications, Iola, WI 54990.

LORD ARNOLD WEINSTOCK, 77, (7-23-02) industrialist. Weinstock was the Managing Director of GEC, which he transformed into one of Great Britain's most successful industrial enterprises. The firm held dominant positions in engineering, electronics and telecommunications (military equipment, refrigerators, gasoline pumps and telephone exchanges). He joined Radio & Allied Industry in 1954. The company became GEC after a takeover in 1961. Weinstock was appointed Managing Director in 1963 and held that position until he retired in 1996. He was knighted in 1970 and was made a Life Peer in 1980.

Information for this column was obtained from *The Big Bands* (4th edition), *The Complete Directory to Prime Network TV Shows 1946-present* (4th ed.), *The Encyclopedia of Jazz* (1st ed.), *The Hartford Courant, On the Air: The Encyclopedia of Old-Time Radio, QCWA Journal, QST, www.broadcastingcable.com, www.kcal.com, www.latimes.com* and *www.nytimes.com*.

Thanks to James Mueller and Stephen C. Taber, W4ITD, for additional source material.

The Communications Receiver



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The Hallicrafters SX-28 Super Skyrider

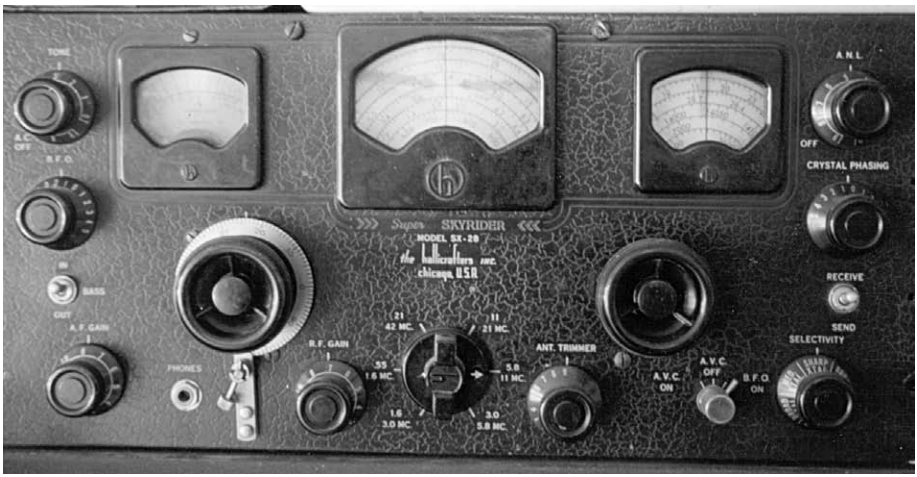
By Jim Hanlon, W8KGI

It is with pleasure that I welcome Jim Hanlon to the ranks of contributors to The OTB. *No novice at writing about short-wave communications gear, he has been featured prominently in* Electric Radio *for a number of years. His subject here is the famous Hallicrafters SX-28 receiver, a work-horse with the WWII U.S. Army.—W2DGB*

In the decade before WWII, the communications receiver made great technical progress. Prior to 1932 it typically consisted of a regenerative detector and one audio stage, perhaps with an RF amplifier; for example the National SW-3. In 1933 the first, basic, plug-in-coil superhets were marketed and the crystal filter was introduced with the Comet Pro, AGS, AGX, FB7, and FBX. RME (Radio Manufacturing Engineers) introduced bandswitching and the one-RF, two-IF, crystal filter and S-meter receiver design (which was destined to become a standard with most manufacturers in 1933) with their RME-9. They added uncalibrated bandspread in 1934 with the RME-9D and RME 69.

The same year, National's legendary HRO offered two RFs, two IFs and a crystal filter, plus chart-calibrated general coverage and bandspread tuning. However, it still used plug-in coils and an external power pack. Hammarlund's 1936 Super Pro had two RFs, three IFs with a crystal filter, an IF bandwidth variable to 16 Kc, bandswitching, and uncalibrated bandspread. Several manufacturers introduced audio noise limiters in 1938 with sets like the NC-100, the RME70, the SX17 and the HQ120X.

The pre-war receiver that put it all together was the 1940 Hallicrafters SX-28 Super Skyrider. It featured six switched bands from 550 Kc to 40 mc, two RF and two IF amplifiers, three settings of crystal filter selectivity and three of variable IF bandwidth, directly calibrated main tuning and amateur bandspread on back-lit dials, a James Lamb IF noise blanker, 8 watts of push-pull, high-fidelity 6V6 audio with a tone control and bass boost, and a built-in power supply.



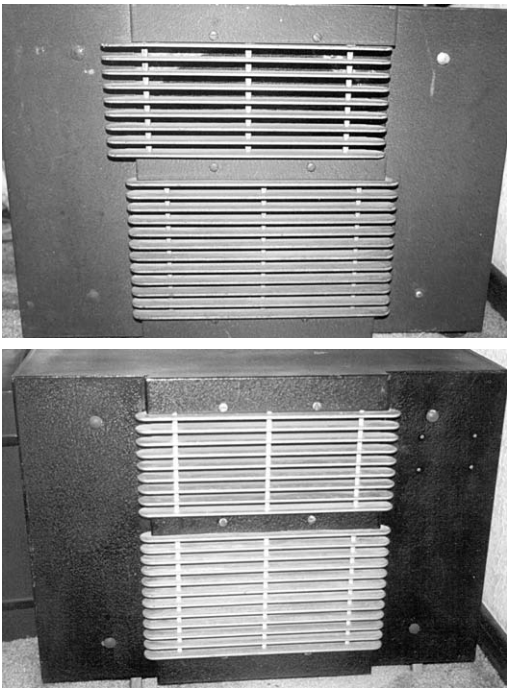
Author's rack-mounted Super Skyrider has conventional "leatherette"-finish front panel.

All of this came in a magnificent 10"×20"×15" art-deco style cabinet with aluminum side-louvers and a black, simulated-leather front panel. It weighed in at a mere 75 pounds. When the SX-28 first hit the market, it sold for $159.50; wartime inflation took the SX-28A up to $238 by 1946.

The accompanying ten-inch PM-23 speaker was an equally impressive 11"×16"×10 1/2" box with front louvers that in some models were rakishly offset. Indeed, this last of the line to proudly bear the Super Skyrider name was the epitome of the handsome and "powerful" radio of its era.

The US Military gave the SX-28 a potted power transformer for the war and called it the AN/GRR-2. Chuck Dachis, "The Hallicrafters Collector," thinks that England used a number of them during the war as well. Fred Osterman, author of *Shortwave Receivers Past & Present*, reports that "a large number of SX-28s were sent to Russia as part of the World War II Lend-Lease Act. When they reached Russia they were modified to accommodate Russian tubes. They are plentiful on the Russian used market."

Altogether about 50,000 of the SX-28 and SX-28A models were built (as estimated by Chuck Dachis), which would suggest that they should be still readily available to acquire and enjoy even today. I acquired my first SX-28 back in 1980 before I realized that I was becoming a "collector." I had kept a weekly schedule with W9EBB from my high school station, W8GYH, from 1952 to 1956, and I had admired their SX-28 from afar. The $25 price via a classified ad in the Columbus (Ohio) Dispatch was right, even if the receiver was not in the best shape.



PM-23 speaker that accompanied author's original smooth-finish SX-28 has offset louver panels above; later acquisition at right has in-line panels. Also known is a version with the Hallicrafters "h" logo.

The set was not working, and its S-meter had been replaced by a generic, round, 0 to 1 milliamp meter. I found a shorted paper bypass capacitor on the second RF stage screen grid, buried beneath the bandswitch. I could see it but I couldn't touch it with a soldering iron, so I had to remove the bandswitch to get at it. This receiver was definitely not designed for easy servicing!

When I was going through the final alignment, the power transformer developed an internal short! I replaced it with two transformers from my junk box: one for high voltage and the other for filaments. But they squeezed out the room allotted for the 5Z3 rectifier, so I used a pair of silicon diodes and a 100-ohm series resistor as a substitute. With these patches and repairs, my SX-28 came back to life.

Somewhat later I found an illuminated S-meter at the Dayton Hamvention flea market. It is not a Hallicrafters meter (the seller thought it might have come from a 75A1 or 75A2), but its shade of sepia was close to that of the tuning dials on the SX-28 and it was calibrated like a real S-meter. That was the good news. The bad news was that its zero-current resting point was on the right hand side at S-0 rather than at the left-hand side as on the original SX-28 meter. So I consulted the ARRL Handbook for an S-meter circuit that worked with this type of meter and modified the SX-28 accordingly. The result was a working S-meter and a decided cosmetic improvement in my old Super Skyrider.

My second SX-28, a rack-mount "A" model, came four years ago via an ad in the Sandia (National Laboratories) News for a very reasonable $50. A retiree was cleaning out a few of his excess boatanchors and as usual I had room for just one more prize. This radio had been built during the war as evidenced by copious amounts of Glyptol lacquer that covered and sealed most of the parts and the chassis. Its owner had acquired it just after the war and had used it in low-hu-

midity Albuquerque, New Mexico ever since, so it was a fully functional, operating receiver with all original parts. In particular, all of the original paper bypass capacitors are still good as I verified by measuring the B+ levels at each of them and by checking their running temperatures with my fingertip. Nine of the original 15 tubes measured in the red zone on my Hickok 533, and I replaced them.

To put it into first-class condition, I also performed a touch-up alignment and replaced the dial cord that drives the band-in-use indicator pointers. By the way, Jim Hawkins, WA2WHV's web page at http://www.qsl.net/wa2whv/hallicrafters.shtml has excellent information on replacing that dial cord. This information is missing from the receiver's instruction manual. It is well worth checking out if you need to do the job.

As you can gather from my discussion, there are two versions of the SX-28: the original 1940 model and the electrically identical SX-28A made from 1944 to 1946. The SX-28A uses a sub-chassis in the RF front-end that puts the coils in somewhat different positions and makes servicing easier. Most, if not all, of the "A" models are labeled "SX-28" on the front panel, but Chuck Dachis advises that the "A"s can be identified by an external fuse holder on the rear apron.

Another identifier may be in the spokes on the tuning knobs. On my rack model SX-28A the webbing between the spokes is solid, while on my SX-28 there is no webbing and the spokes are open. Of course my SX-28 is also somewhat unusual in having a smooth, dark gray front panel rather than the standard black, leather-grained finish. So its knobs could be a little strange as well. *(NOTE: Ray Moore in his book Communication Receivers also lists a model SX-28FCC manufactured for the Federal Communications Commission. If you run across an SX-28 with a special label under the main dial, take a good look. You may have a rare receiver. Ed.)*

I can recommend two good sources of technical information about the SX-28. The original Hallicrafters instruction manual contains a comprehensive description of the circuits and features as well as the usual schematic, alignment and operating instructions. There is also an article in the June 1990 Electric Radio magazine by Bill Kleronomous, KD0HG. Bill reports on his SX-28 as follows. He measured stability after a 90-minute warm-up. At 7 mc drift was five Hz after five minutes and 50 Hz after ten minutes. At 14 mc it was unmeasurable after ten minutes and only 25 Hz after 20 minutes. The BFO drifted 200 Hz in the first ten minutes of operation and settled down after that.

AM sensitivity, measured at the 10 dB S+N/N point, at 1, 4, 14 and 30 mc came in at 2 uv, 2 uv, 0.7 uv and 1 uv respectively - but Bill was using a 6AC7 in the first RF amplifier instead of the original 6AB7. Image rejection was 30 dB at 30 mc, 40 dB at 14 mc, and 55 dB at 7 mc. The 6 dB-down selectivity in the "Broad" position was 14 Kc and 5 Kc in "Sharp." In the "Broad Xtal" position it was 3 Kc, narrowing in the "Sharp Xtal" position to only 30 Hz and with a 70 dB phasing notch rejection of signals on the other side of zero beat!

Audio bandwidth with the "Bass" switch on, the tone control set for maximum highs, and selectivity on "Broad" was down 2 dB at 6 Kc and 10 dB at 8 Kc. On the bass side it was down 3 dB at 200 Hz and 10 dB at 50 Hz. Audio distortion was 3% or less up to 500-mw output, rising to 5% at eight watts. The noise limiter, an IF blanker circuit, was able to totally eliminate an S9 +10 pulse noise generated by an SCR light dimmer and to make an S9 broadcast station completely readable with very little distortion! In my experience, however, the noise limiter doesn't do nearly as well as the audio limiters in my NC-200, HRO-50 and RME-70 on lightning-static QRN.

Potential owners should be aware of one peculiarity of the SX-28: its 500-/5000-ohm audio output impedances. The 5000-ohm output is intended to match the 5000 ohm-to-voice-coil transformer that is standard in the Matching PM-23 speaker. This output is automatically cut off when a plug is inserted into the headphone jack. The 500-ohm output was commonly used to drive a remote speaker line, and the headphone plug does not cut off this output. These days it is much easier to find a 500 or 600 ohm-to-voice-coil transformer, and it's easy to change the wiring on the phone jack to switch the 500-ohm line rather than the 5000-ohm line. So if you do not have an original Hallicrafters speaker, you do have other options. In a real pinch a 12.6-volt "filament" transformer from Radio Shack could be used to transform a 4-ohm speaker to about 363 ohms or an 8-ohm speaker to about 726 ohms. Just don't expect it to have "high-fidelity" frequency response.

On the air, as you might expect from Bill Kleronomous' report, the SX-28 is even today a thoroughly competent communications receiver. If you are looking for a solid, pre-1950 receiver to use in the Link Cundall Memorial Contest or the Classic Exchange, or you'd just like to use a handsome boatanchor to listen to the short waves, an SX-28 or SX-28A would be an excellent choice.

Bring Historical Circuits to Life On Your Workbench!

Build a Simple Oscilloscope – Part 2

We're in the midst of a three-part breadboarding job—a bench oscilloscope for analyzing waveforms at audio and maybe beyond. Last time we stopped with some power supply parts mounted on an open chassis, and now we'll add the 'scope tube and determine some preliminary component values. Figure 1 repeats the schematic of our power supply with resistors identified. These are the values that worked for my breadboard; if you're making one, too, your numbers may differ somewhat. Here's how to find what works for you.

I decided to run the 902 CRT at about 500 volts total: the cathode at -350 and the second anode and deflection plates sitting at +150. When I had gotten close to those voltages with 100K resistors in all four places in the negative supply and +150 volts on pin 1 of the CRT, I could see a green spot near the center of the screen when pins 4 and 6 were also held at +150. But the spot was out of focus and kind of dim.

Since pin 5 is the control grid and sets the CRT current, dropping the resistor value between pins 2 and 5 made the grid less negative and brightened the spot. 33 K worked well for me. Pin 3 of the CRT is the focus grid, and I found that my spot got smaller (and brighter) when the voltage at pin 3 was about - 200 volts. So with 100 K from the cathode to pin 3, I got just about - 200 volts on pin 3.

Checking current drains, we note bleeder current is about 1.17 mA (350 volts across [100+200]K). The voltage drop across the 33 K cathode resistor is 50 volts, so there are 1.515 mA flowing there, leaving about 345 uA of beam current. Seems reasonable, given that I didn't measure exact resistor values. Now let's look at the sweep circuit (Figure 2).

It must have a name, but my college text (1) didn't mention it. I'll call it a totem pole sweep, because the two tubes it uses are in series from B+ to ground. On top is a 2D21 thyratron, with a 6AU6 pentode underneath.

A thyratron is a gas tube: it's an open circuit until the grid voltage, with respect to the cathode, rises toward some threshold voltage, whereupon it conducts as hard as it can. You can't turn it off until the gas in the tube stops being ionized, then it's in cutoff again.

The way the circuit works is this: the 2D21 comes on and charges a capacitor selected by the sweep speed switch, toward B+ (300 volts here).

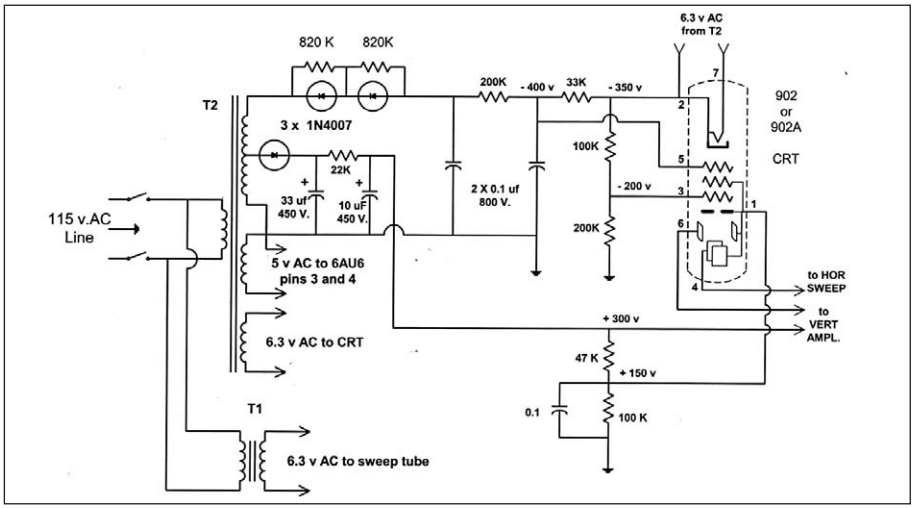


Fig. 1. Power supply schematic from Part 1 with resistance values now determined.

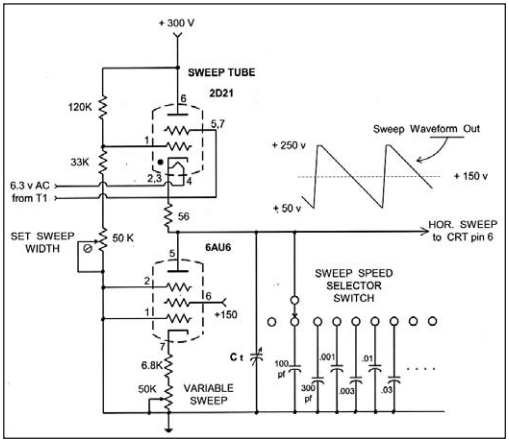


Fig. 2. My "totem pole" sweep circuit.

When the capacitor voltage has risen to about 250 volts, the thyratron can't keep conducting any more because its ionization quits. So then the cap discharges through the pentode at nearly constant current. When the capacitor voltage gets low enough, the thyratron fires again and the process repeats.

The waveform across the pentode and the selected sweep capacitor is pretty nearly a straight line, ideal for a CRT sweep, and one can adjust the sweep rate with a pot in the 6AU6 cathode. To make the width of the trace on the screen wider or narrower, one changes the trigger voltage at the 2D21 control grid. The 56 ohm resistor in the 2D21 cathode limits the tube current to a safe value when it fires.

By trial and error, I found that the 902 needed about 200 volts of sweep amplitude. Since the spot is centered at +150 volts on pin 4, my sweep signal had to move between +50 and +250 volts to cover the screen. I decided to put a 50 K pot in the ground side of the 2D21 grid divider so I could adjust the tube's firing point, and therefore sweep width. Then I had to tweak the 300 volt level feeding the entire circuit to put the trace in the center of the 902.

Most good scopes have centering controls, but I might do without them. When I build the vertical amplifier, which will draw from the 300 volt supply, it may de-center the trace again, but I'll burn that bridge when I come to it.

In the photographs, you can see the two sweep tubes just above the power transformer. The sweep speed selector switch is at the center of the front panel. Note the group of capacitors connected to it. In my scope I have used a trimmer cap at Ct, to set the fastest sweep speed at a value somewhere between 50 and 100 microseconds, about as fast as the totem-pole sweep can go.

This means that 1000 kHz will be about the highest frequency I will be able to see; then there will be 30 cycles to the inch if the two-inch sweep takes 60 microseconds. For fine control of sweep speed there's the 50K pot just below the (coarse) sweep switch.

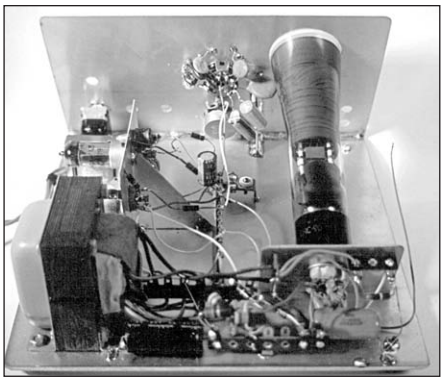
The wire hanging loose on the right of the rear view will go to the vertical amplifier that I'll report on next time.

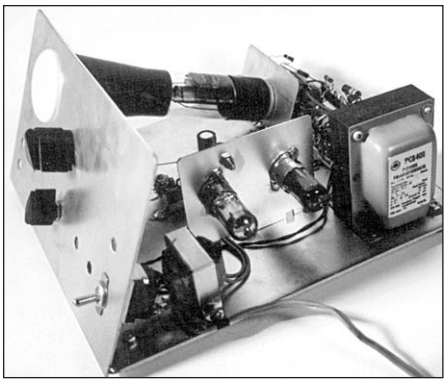
In the Mail

Doug Fox, of St. Charles, IL sent me some good info on a useful homebrew oscilloscope with a simple circuit. Watch for his treatment of that 'scope after we finish with this one.

Reference

(1) *Pulse and Digital Circuits*, Millman and Taub, McGraw-Hill Book Co, 1956, pp 234-5

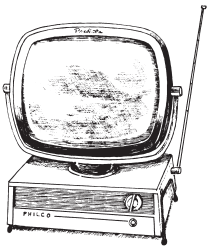




Two views of our "scope in progress" show construction completed to date.

TELEVISION

EDITED BY **RICHARD BREWSTER**, 145 LITTLE PECONIC BAY ROAD, CUTCHOGUE, NY 11935 *PLEASE INCLUDE SASE FOR REPLY.*



Development of Television in Germany In the Pre-Electronic Period

By Franz Pichler, Linz, Austria
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In this article we want to investigate the establishing of television systems in the electro-mechanical era. We limit our selves to development in Germany, where the invention of the electrical-mechanical television by the student Paul Nipkow in 1884 was a starting point.

General Requirements for Television

First we want to define "television." To distinguish from picture telegraphy, the electrical transmission of a picture by a wire-channel or by a wireless channel, we use the explanation as given once by the well known American radio-journalist and pioneer in science fiction Hugo Gernsback who said "television means instantaneous sight at a distance." Compared with picture telegraphy, television has to transmit moving images. In general a television system has to include the following elements:

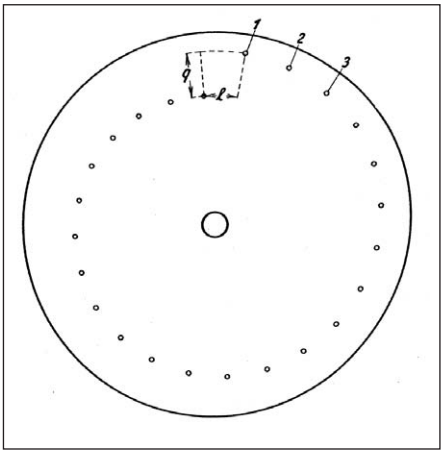

Fig. 1. Nipkow disc, showing spiral arrangement of holes.

(1) A system to scan fast optical images and to transform optical signals into electrical signals ("television camera").
(2) An electrical transmission system ("television transmission channel").
(3) A receiving device to transform electrical signals into optical images ("Television receiver").

The sensitivity and the quality of resolution of the television camera, the quality of the transmission channel as given by its bandwidth (channel information capacity), its synchronizing ability and its resistance against noise as well as the quality of the receiver as given by different features such as brightness, geometrical correctness, sharpness and others, determine the overall quality of a television system. Certainly such requirements, which are fulfilled to a high degree in modern electronic television systems, were difficult to meet by mechanical television systems.

Pre-Electronic Technologies

Nipkow's Disc System. In his patent of 1884, Paul Nipkow of Berlin, then a student, proposed the following television system: A perforated disc (later called a "Nipkow disc") scans an optical image through its 24 holes arranged in a spiral (Fig. 1). The resulting sequence of 24 one-dimensional optical signals are received by a selenium-cell and transformed into an electrical signal. After transmission, the electrical signal controls a fluorescent lamp so that its brightness is proportional to the magnitude of the signal.

The lamp is viewed through the holes in a second Nipkow disc synchronized with the disc at the transmitter. Thus, an exact copy of the transmitted optical image is written line by line. The number of holes in the disc determines the number of lines of the received image. The distance between the individual holes gives the width of the image. The depth of the spiral of holes of the disc determines the height of the image. The number of turns of the disc per second is equal to

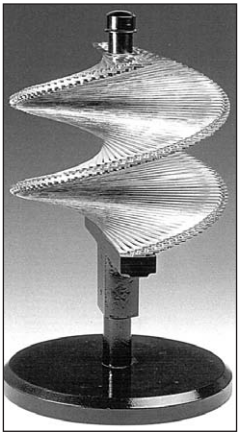

Fig. 2. Okolicsanyi's mirror-screw.

the transmitted images per second.

Mirror Systems. The mirror-drum (phoroscope) of Lazare Weiller (1889) used, as a scanning device, a revolving drum with flat tilted mirrors attached to its circumference. Each mirror has a slightly different angle from the one preceding so that the entire scene is scanned in each rotation.

In 1930, F. V. Okolicsanyi designed a television receiver incorporating a rotating "mirror screw" system in which stacked mirror-strips are fanned out at constant angles (Fig. 2). Each mirror creates a line of the image as it rotates. The mirror-screw could be manufactured with higher precision than the mirror-drum and the individual mirrors were easier to calibrate.

The mirror-ring proposed by the Hungarian inventor Denes von Mihaly (1933) represented an important improvement over the previous mirror systems. Its main advantage lies in improved synchronization. Both the mirror-drum and the mirror-screw inevitably have a high moment of inertia. The mirror-ring of Mihaly, however, has only a little mirror as its moving part.

This rotating mirror is surrounded by mirrors mounted on a ring (Fig. 3). Each of these mirrors reflects the received light beam in as a line on a screen. The different axial angles of the mirrors on the ring generate the picture line-by-line.

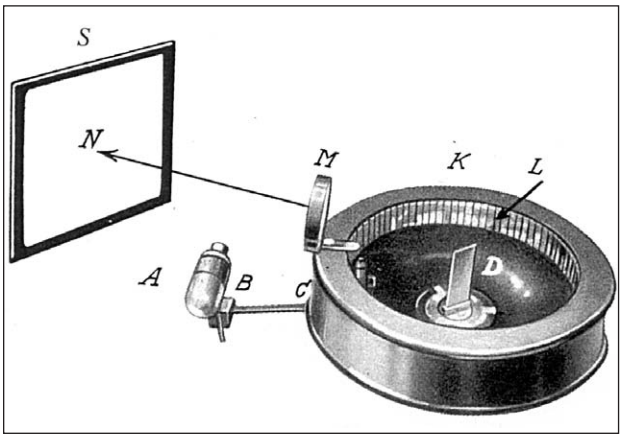

Fig. 3. Mihaly's mirror-ring.

Practical Mechanical Television Systems

Now we will discuss some of the practical mechanical television receivers that were developed using the Nipkow disc, the mirror-drum of Weiller, and the mirror-screw or the mirror-ring.

Nipkow Disc Receiver. In Germany the main support for mechanical television based on the Nipkow disc came from Mihaly. At the radio and television show *(Funkausstellung)* of 1928, in Berlin, He presented a Nipkow-disc television receiver with 30 lines and 10 pictures per second. The goal was to develop a "Peoples Television Set" (*Volksfernsehapparat*).

In 1930 the TeKaDe company purchased the Mihaly patents and immediately produced a kit, called "System Telehor," for the assembly of a Nipkow-disc television set by amateurs (Fig. 4). This television set could be switched to receive programs from the station Berlin-Withleben (wavelength: 418 meters, horizontal scanning) or from the station of the Baird television company in London (wavelength: 356.3 meters or 261.3 meters, vertical scanning). In addition to the television set two radio receivers were necessary to receive the signals for pictures and sound.

Mirror Receivers. In Germany, the mirror-drum of Weiller was used mainly the "System Karolus" receivers of the Telefunken company. August Karolus (1893-1972), Professor of Physics at the University of Leipzig, had invented a light-modulator of high velocity, the "Karolus Zelle" (1924). Using the "Karolus Zelle" and a mirror-drum (Fig. 5), Telefunken developed a receiver which projected the picture on a screen. Germany's leading television companies (Loewe AG, Fernseh AG, Telefunken, TeKaDe) also worked with the mirror-screw of Okolicsanyi and developed receivers based on its principles (Fig. 6). In addition, after acquiring the Mihaly patents, TeKaDe set up a research effort to develop a practical application of the mirror-ring system.

In this presentation, we've tried to feature examples of mechanical television sets which were put to some practical use. The sets produced in

Germany mainly served marketing purposes at exhibitions. With the development of the cathode-ray tube for the electronic synthesis of moving pictures (Manfred von Ardenne in Germany, Vladimir Zworykin in the USA, both from 1930 on), mechanical television receivers became obsolete. By about 1935, mechanical receivers were being replaced with electronic ones..

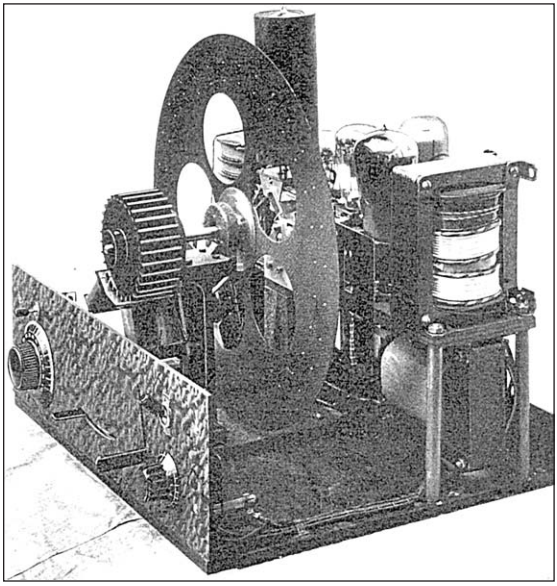

Fig. 4. "System Telehor" with radio receivers.

Image Scanning Methods

The Nipkow disc played a major role in image scanning at the television station until it was replaced by electronic methods such as the iconoscope of Zworykin and the image dissector of Farnsworth. In the beginning the selenium cell was proposed for the transformation of the scanned light signal into an electrical signal. But the selenium cell was quite slow and a photoelectric cell together with electronic amplifier proved to be more suitable. Together with improved forms of Nipkow-discs this system provided the necessary sensitivity for a television camera, especially for its use in sequential scanning of motion pictures.

Finally, Telefunken's "lens-cylinder" (*Linsenkranzabtaster)* image scanning device, designed by Emil Machau of AEGA, was a masterpiece of engineering. It operated at 180 lines and 25 pictures per second. But the main problem with all these mechanical image cameras was their relatively low light sensitivity. Although they were sufficient for the scanning of motion pictures and for indoor use with studio lighting, they could not, in general, be used outdoors.

One solution to this problem was provided by the *Zwischenfilmverfahren* ("wet film interface process") of the Reichsrundfunk-Gesellschaft (from 1935 on). In this process the images were first captured by a normal motion picture. The film was then immediately developed and, while still wet, sequentially scanned by a Nipkow-disc. The process was so rapid that the television signal could be transmitted with only a few minutes of delay.

Concluding Remarks

Our discussion of the development of television using mechanical means for image scanning in the transmitter and image synthesis in the receiver concentrated on the situation in Germany. During that era, television was controlled rigidly by the government and was restricted to special public locations (*Fernsehstuben*) where people could watch the program. During the time of the

(continued on page 65)

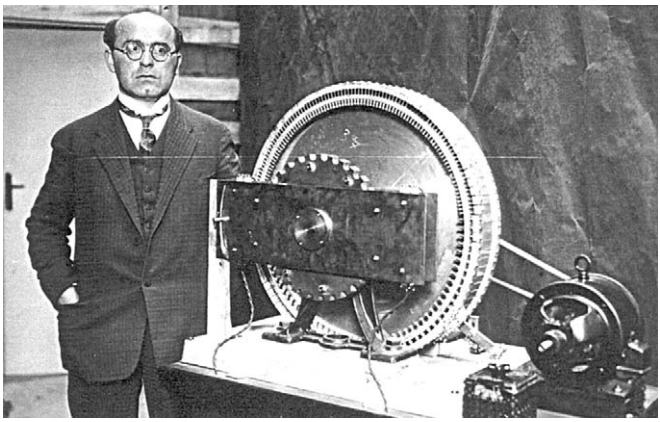

Fig. 5. Professor Karolus with Weiller mirror-drum.

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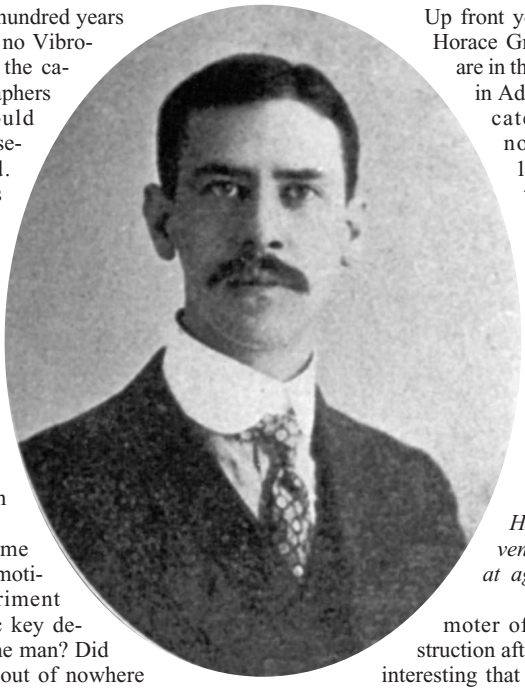
Horace G. Martin

— Part One: The Telegrapher —

Behind all the data that exists today about Vibroplex keys: the various models, their manufactured dates, and the many labels, is the story about Horace G. Martin. Without Martin's sole invention of the Martin Vibroplex, almost a hundred years ago, there would be no Vibroplex Company, and the careers of many telegraphers in this country would probably have been severely shortened. Martin's inventions in semi-automatic key design have been used by thousands of commercial, press, military and amateur telegraph and radio operators both on land and at sea for decades, yet very little has been documented about Martin himself.

Where did he come from? What or who motivated him to experiment with semi automatic key designs? What about the man? Did he seemingly come out of nowhere just to seize a marketing opportunity for telegraphers who were suffering from "telegrapher paralysis?" This was a crippling syndrome resulting from the daily abuse of manipulating a manual telegraph key. It affected the arms of many telegraphers.

I will attempt to answer these questions in a multi part article that will trace Martin's life at least to the point where he first introduced the Martin Vibroplex. This installment will cover his early years. It that will also focus on a very remarkable telegraphic event in which Martin participated as a young man. Some of you may have heard, or suspected, that Martin was a telegrapher before he invented his famous Vibroplex. After reading this installment you will learn that Martin was not just an ordinary telegrapher, but one of the finest telegraphers in the United States.



Horace G. Martin, Inventor of the Vibroplex, at age 30.

Up front you should know that Horace Greeley Martin's roots are in the South. He was born in Adairsville, Georgia, located about 50 miles north of Atlanta, in 1873. It would appear that Robert and Sarah Martin, when selecting a name for their son, were influenced by the life of Horace Greeley, founder and editor of the New York Tribune, who had died a year earlier. He was popular in Georgia as a promoter of the south's reconstruction after the Civil War. It is interesting that Martin's career as a telegrapher, either by coincidence or design, heavily favored the press service.

Martin's father was a former confederate soldier. At the time of Horaces birth, he worked as a miller in a grain mill just east of Adairsville in Pine Log, Georgia. As a youth, Horace spent his time at the train depot in Adairsville, where he first learned telegraphy. Adairsville was the halfway stop between Atlanta and Chattanooga, Tennessee for the Western and Atlantic Railroad. Martin was hired as an extra operator for the railroad when he was only nine.

He was recognized for his excellent penmanship and typewriting abilities even before he be-

came a teenager. Because of these abilities, he was hired as a telegrapher for the Associated Press in Atlanta while in his early teen years. Later, he left the Associated Press to work for Western Union in Atlanta, advancing to the position of chief operator for the entire Atlanta office.

Still in his teen years, Martin was married to Miss Gena Stephens of Atlanta. She was the cousin of Alexander Stephens, the former vice president of the Confederacy, and the daughter of James M. Stephens. Like Martin, James Stephens had roots as a telegrapher with the Western and Atlantic Railroad. He later became the superintendent of Western Union's southern operations. In 1893, Horace and Gena Martin became the parents of Horace G. Martin Junior, the first of their eight children. The motivation behind some of Martin's later moves in life can be best understood knowing that he and his wife were from Georgia.

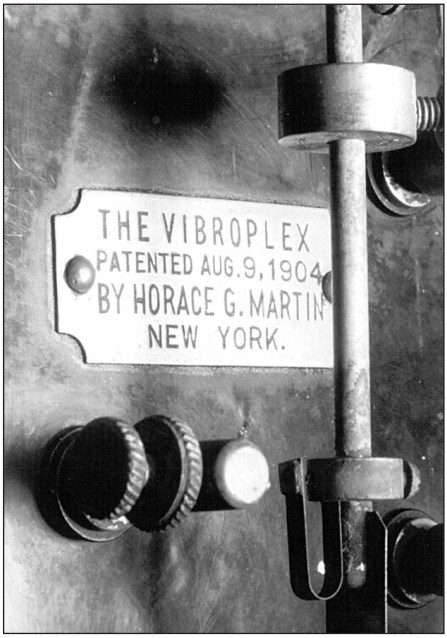
As Martin gained more and more experience as a telegrapher, he found opportunities to work circuits of greater importance. Telegraphers with the ability to move high volumes of copy in the least amount of time received the best pay, and Martin jumped around from city to city seeking such positions. He was re-employed by the Associated Press, this time based in Memphis, Tennessee, to work their important Memphis - New Orleans wire.

He became known on the wire by his personal "sine" (call sign) of "HM." As time went on, "HM" developed the reputation as being one of the best senders *ever* in the press service. Martin was also ambidextrous and had a talent as a telegrapher for doing totally different tasks simultaneously.

With this kind of reputation still better opportunities awaited him in New York City, where the nation's largest telegraph hubs were located. Early in New York he found employment with some of the brokerage firms on Wall Street or, as telegraphers referred to it, "The "Street." But by the mid 1890s he was back in the press service working for various newspapers as a telegrapher, reporter, and telegraph editor.

During the 1890s two major U.S. news organizations were competing fiercely for newspaper contracts.

These were The Associated Press and The United Press (not to be confused with UPI, which was organized later). Both were headquartered in New York City at Western Union's 195 Broadway building. Martin's next move was to work as a telegrapher for The United Press. There, he developed important associations with certain people that, would directly or indirectly,



Label of early-production Vibroplex.

affect his career in the years to come. They included: General Manager Walter P. Phillips, a long time telegrapher, newspaper editor, and the inventor of a telegrapher's short hand called the Phillips code; Roderick Weiny, Lead Engineer and Electrician; and Fred Catlin, a prominent telegrapher famous for the "Catlin grip," a standard method of handling a telegraph key.

In early 1897, the United Press, losing most of their major contracts to The Associated Press, filed for bankruptcy. By April 8, 1897 The United Press had ceased operations and laid off all of their employees, including Martin. Walter Phillips went off seeking new business opportunities while Martin went back to work for Western Union. The commute from his home at 377 Seventh Ave. in Brooklyn remained almost exactly the same; he merely reported to work on a different floor at 195 Broadway.

In 1898 an event took place in Martin's life that is a story in itself. On May 14th of that year, a major telegraph competition was to be held as part of an electrical exposition sponsored by the New York Electrical Society. It overshadowed any contest of this type previously attempted and it was appropriately named "The Grand National Telegraph Tournament." No better a place could have be selected for such a competition than Madison Square Garden. Cash prizes were to be awarded to the first and second place winners in

three categories for both sending and receiving: a message class, code class, and the most difficult, the championship class.

Invitations to officiate as judges went out to a list of distinguished men associated with the field of telegraphy. Accepting as an honorary judge was Jessie Bunnell, former Civil War telegrapher and senior partner of the telegraph equipment supply firm, J.H. Bunnell & Co.: "I will serve as a judge, but hope that you will find enough more old 'has beens' for associate judges, to enable us collectively to read fifty words per minute…Of course we will also do anything else that is desired, in the way of furnishing necessary apparatus…"

Thomas Edison, a former telegrapher himself, had similar sentiments with his colorful reply : "I may come over and act as a judge of 50 word a minute Morse, but I am afraid I would not understand it. The Morse that I was brought up on was about as perfect as the record slip* on a deep sea cable. But if such fossils as Bunnell…are going to pretend to read copper plate Morse**, then I may come over and look wise."

The main event in the tournament was the championship class competition. Six senders would send five minutes of text each—selected appropriately from The Old Testament's *Book of Judges*. A panel of Judges would award prizes to the fastest two telegraphers with the least number of errors. On the receiving side of this competition, prizes would be given to the top two receiving telegraphers with the least number of errors copied with a typewriter of the operator's choice. The omission or addition of any character, including punctuation marks, would count as an error. The receiver had to accurately copy the sender's mistakes. Horace Martin was one of fifteen telegraphers competing as a receiver in this class and was one of eight from Western Union of New York City.

The tournament setting was in the concert auditorium of Madison Square Garden. The contestants were seated up on the main stage among a maze of positions, each equipped with a typewriter, sounder and resonator. The judges were off in separate quiet rooms. For the first time in tournament history, permanent phonograms were made of the six senders and these could be duplicated later for play back on a phonograph or a graphophone. The majority of the telegraph equipment was furnished by J.H. Bunnell & Co. with Western Electric also helping out. Western Union and Postal Telegraph, along with typewriter manufactures Smith-Premier and Remington, contributed money for the cash prizes. Smith-Premier also offered to supply a "mill" to any telegrapher unable to transport a personal machine to the tournament.

That Saturday night The Garden was filled to standing room capacity for the start of the championship class competition. Anyone who was anybody in the telegraph business, along with every off-duty telegrapher in the New York metro area, was said to be in attendance. For previous tournaments, the spectators could listen in to the Morse being sent with various sounders placed in the crowd. For this event, three gigantic megaphones, each with a sounder mounted in its throats, were set up on the stage. They looked like three large cannons protecting a perimeter of a fort.

The Master of Ceremonies marked the beginning of the championship session and introduced the first sender. The official timer recorded the start and one by one each of the six senders sent five minutes of material. At its conclusion, Martin handed in seven sheets of typewritten copy to the judges. The results of the senders ranged from 43 wpm with 10 errors, to 50.8 wpm and one error. Martin's copy was praised by all of the judges as "being the cleanest and most perfect of all the copy handed in" and was an outstanding example of fast telegraphy and typewriting ability. But, there was a problem. Through a misunderstanding, Martin neglected to put the name of the sender at the top of each page he submitted, an omission that technically cost him seven errors. This put the judges in a dilemma. On one hand they were looking at Martin's perfect copy; on the other, the stated rules said the senders name had to be on each sheet. The judges could not come to a decision that night and sent everyone home while they deliberated over the week end for a decision. On Monday, they announced that Martin had been charged with the seven errors. The first and second prizes were awarded to two telegraphers who had three and five errors, respectively, in their copy.

In the days and weeks following the tournament, some publications talked about the Judge's controversial decision. One of the major telegraph publications of the day, *The Telegraph Age*, offered their unsolicited support for Martin. They did not contest the judges' decision but, like many telegraphers who were at the Garden that night, they were clearly aware of the perfect

** Record slip: a recording of the bipolar current pulses, representing Morse characters, received through long sea cables. The pulses were sometimes erratic in amplitude and duration.*
*** Copper plate Morse: an elegant style of handwriting typical of telegraphers.*

copy turned in by Horace Martin. This publication made certain that their readers also knew about it. The "official" winner went on to become a footnote in telegraph tournament history, but *The Telegraph Age* documented a more important fact by stating : "It is safe to say there is no better telegraph operator in America than Mr. Martin."

Since Martin had the reputation of being one the best senders in the press service, you might wonder why he did not enter the championship class competition as a sender. A reason that should not surprise you is that, by 1898, Martin was personally suffering from telegrapher's paralysis. After years of sending nearly 20,000 words of press copy per shift, he felt that he was losing his grip.

In the months following the Grand National, Martin began to go through a transitional period in his life. He was now a 16-year veteran telegrapher who had not yet reached his 25th birthday, but the "paralysis" threatened his ability to support his growing family at the pay level of a star telegrapher. In the following year he would start "periodic experimentation" with various ideas to transmit Morse other than with a manual telegraph key and would begin to seek employment opportunities that would help him develop these ideas.

Horace Martin's efforts would ultimately evolve into an inexpensive solution that would help telegraphers afflicted with the disability and would change his career from being a telegrapher to being an inventor and manufacturer…

TELEVISION, *continued from page 61*

Nazi regime, the private television viewing was practically impossible.

Today we are at another turning point in television technology. We are moving towards a time when television signals will be generated digitally. The use of computer technology in both broadcast station and receiving equipment will make it possible to introduce, or improve, user services such as pay TV and TV on demand. Besides these positive developments in television technology, we should not forget that television today is a potent medium for influencing society. This means that politics and business have strong motivation for controlling its use. An extreme and chilling example is the use of mass communication media during the Nazi regime (1933-1945) in Germany.

Norbert Wiener, the famous US mathematician and "father of cybernetics," analyzed the possible consequences of the control of television by such interest groups as early as 1948. His conclusion was very pessimistic. He felt it was crucial that the public (represented by the users) control the television medium. Yet today, in the U.S.A. and Europe, business interests remain very much in control of our television programs.

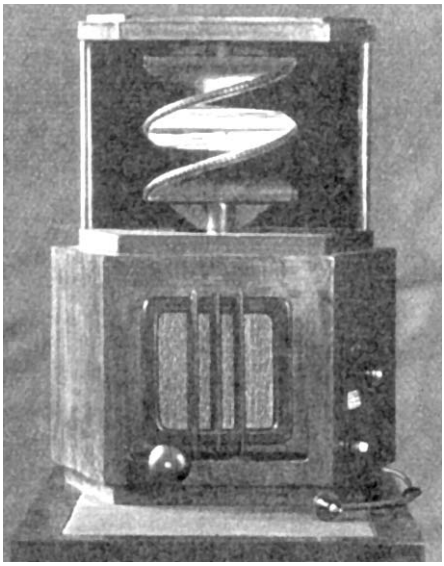


Fig. 6. TeKaDe mirror-screw receiver.

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The Decremeter and Grid Dip Oscillator: VLF Through UHF

Part 2—The Hardware

Part 1 of this three-part series (August 2002 issue) discussed basic resonant circuit theory, which is a necessary prerequisite to understand the operation, application and limitations of the decremeter and GDO. Take the time to read Part 1 now if you have not already done so. For a brief discussion of decrement, you should also review the author's article, "Understanding Obsolete Units," in the November 2001 issue.

The Basic Wave Meter/Absorption Frequency Meter

In their simplest form the decremeter and GDO are one and the same, even though they were developed about a half-century apart. The heart of these instruments is a parallel tuned circuit with a device or circuit that indicates the presence of a circulating RF current. In the pre-1930 era, the decremeter was also called a wave meter[1]. After World War II this device evolved into the Grid Dip Oscillator (GDO).

Depending upon the era and model, many of these instruments included circuitry that allowed them to be used as a simple RF signal source. (For the decremeter, this RF source was external to the instrument.) The signal source allowed the instrument to excite a passive circuit in order to obtain important information about it. For example, a GDO is commonly used to excite an antenna system to determine the natural resonant frequencies of the antenna circuit.

The basic wave meter/absorption frequency meter is shown in Figure 1. It operates by absorbing RF energy from an external circuit that contains RF energy. The RF energy is can be coupled to the instrument either by inductive or capacitive means. Two forms of the basic instrument are shown: (a) with an RF current sensing device in series with the inductor-capacitor, and (b) with an RF voltage-sensing device connected across the capacitor. If, referring back to Part 1 of this article, we wish to maximize the performance of this parallel tuned circuit (assuming that the circuit tunes very sharply to allow for maximum frequency discrimination), the RF indicators must meet certain criteria. These criteria are:

(a.) They must respond to the range of RF frequencies intended to be to be measured with the instrument. The pre-WWI through 1920s decremeter was intended for use over a frequency range from a few tens of kilohertz to a few hundred kilohertz. The post WW2/Korean

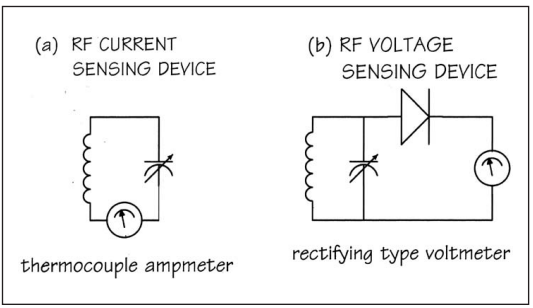

Fig. 1. Basic Wave/Absorption Meter

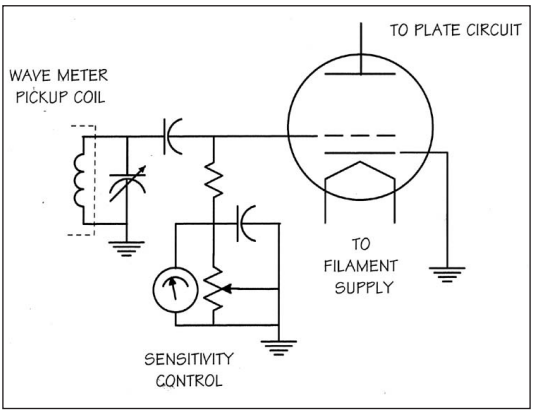

Fig. 2. Grid-Cathode Type R.F. Voltmeter

War era GDO commonly covered a frequency range from a few hundred kilohertz through a good part of the VHF region. Some GDO designs are suitable for use well into the UHF band.

(b.) They must be appropriate to respond to the power in the circuit being measured. Obviously, the indicator used to measure the frequency of a receiver's local oscillator must be able to read "flea power." At the output of a kilowatt transmitter, however, there is a fair amount of power available. The RF indicator must be able that power without burning out and must have a means to keep it from slamming full upscale.

(c.) If we want to maximize tuning discrimination, the current sensing device must have a very low RF resistance. This means the Q of the instrument's LC circuit is maximized (or the instrument's decrement is minimized). In Figure 1(a), the RF indicator is an RF ammeter, or in modern terms an RF current sampling device.

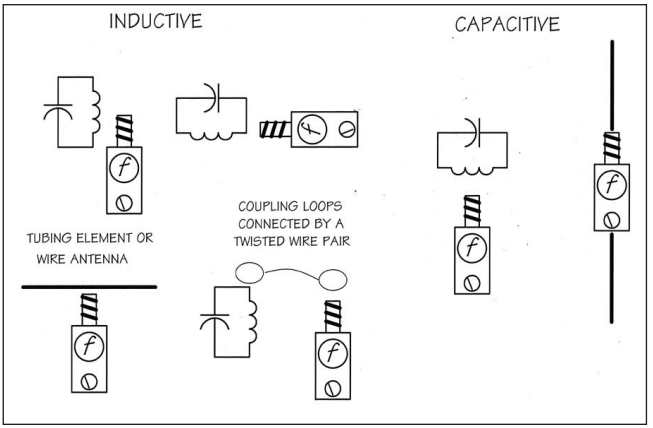

Fig. 3. Decremeter/GDO Coupling Methods

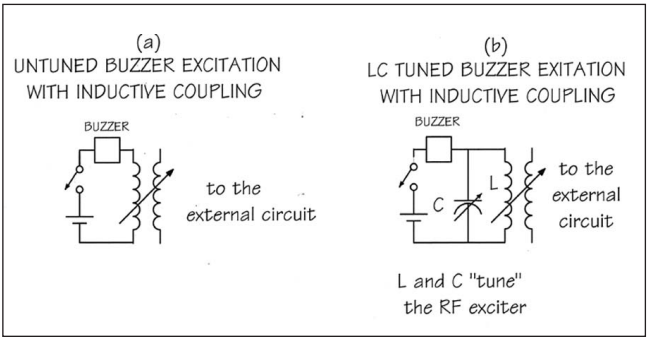

Fig. 4. Decremeter R.F. Generators

(d.)If the RF indicator is a RF voltage-sensing device, it must present very high impedance to the parallel tuned circuit in order to maximize Q, or tuning selectivity. The indicator can be an RF voltmeter as shown in Figure 1(b) or the grid-cathode of a zero biased DC amplifier tube (or transistor) as shown in Figure 2.[2] The higher the impedance, the more frequency-selective the circuit becomes.

Coupling Energy Into the Wave Meter/Absorption Frequency Meter

Figure 3 shows various inductive and capacitive methods for coupling RF energy into the decremeter and GDO, with the GDO used in the "diode" or absorption mode. Inductive coupling is a transformer action where the axis of the instrument's coil is parallel to the axis of the RF source's coil. In capacitive coupling, the instrument's coil is at right angles to the RF source's coil. If the decremeter or GDO contains an internal RF source, and the instrument is used to excite a passive circuit, the same types of coupling can be used.

Which type of coupling do you use? The answer is simple: the one that works the best for the power level involved and the geometry of the circuit being measured.

How close do you have to couple? Well, if an absorption wave meter is used to "sniff out" the presence of harmonics and spurious frequencies in the output circuit of a tube type kilowatt transmitter, you don't want to get too close! Most decremeter and GDO designs have sensitive enough RF indicators so that you do not have to get "nose-to-nose" with the business end of a kilowatt amplifier, or even a 25 watt amplifier.

What about coupling to the local oscillator of a transistorized radio receiver? Obviously you have to get up close.

But close coupling does present problems. From Part 1 of this article we know that close coupling broadens the frequency selective char-

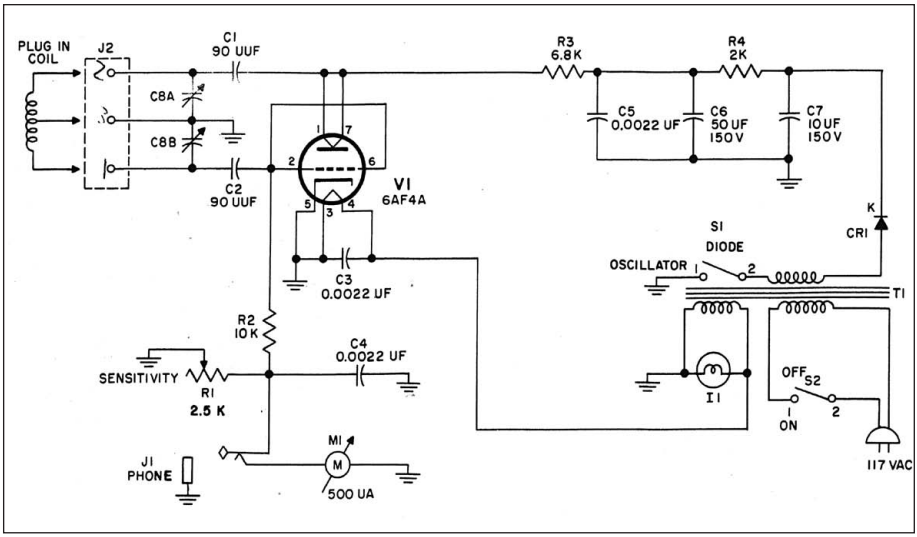

Fig. 5. Circuit of the Eico Model 710 Grid Dip Meter

acteristics of a tuned circuit. Over coupling could disturb the operation of the RF source and/or give a broad tuning (non-definitive) indication of the decremeter/absorption wave meter's RF indication.

One last point to make with the wave meter/absorption frequency meter. "Can the meter indication be calibrated in units of power in the RF source?" Generally, no. Again referring to Part 1, there is no practical way to use coupling geometry (dimensional measurements) to calibrate coupling coefficient.[5] Other design factors also frustrate attempts to make the quantitative measurements. We can make a strong-weak determination, but we can not say how much.

The Decremeter/GDO as a Signal Source:

We have already mentioned that many instruments contain an internal RF source that can be used to excite a passive circuit. For example, if we have a parallel tuned plate circuit in an OT transmitter, and we key down, there is an RF field around the tuned circuit that can be intercepted by the wave meter/absorption frequency meter's coil. But what if we want to "pre-tune" the OT transmitter's plate circuit before we apply DC power? Now what? Simple, flip the switch to activate the instrument's internal RF source.

Figure 4 shows two different RF generators used with some decremeter models. Recognize them? Sure you do, the breaker points in the buzzer are a vibrating spark gap! In other words these circuits behave as a mini-spark transmitter/exciter. Connect the battery, turn on the vibrator, and we shock-excite an external circuit. Surrounding the RF generator's coil is a weak RF field that can be inductively coupled to a passive circuit.

As we couple to a passive circuit and tune the decremeter's capacitor (we may have to try different search coils, which were usually untapped plug in coils), we may see a flicker of the RF indicator in the decremeter. Hone in on this flicker by carefully tuning the decremeter, adjusting the coupling, and possibly tuning the external passive circuit, and voila! We can now mentally trace out the resonance curve of the coupled tuned circuit as we rotate the decremeter's dial!

The untuned generator of Figure 4a *shock excites* the external circuit through an accessory transformer. It behaves like an ignition spark coil. Its effect on the tuned external circuit is similar to exciting a bell by whacking it with a hammer. The tuned version (4b) shock-excites *its own* LC circuit and the resulting filtered oscillations are inductively coupled to the external passive circuit. Obviously, the untuned circuit produces a broader range of frequencies in the external circuit then the tuned circuit.

The untuned circuit shock excites the external circuit through an inductively coupled transformer. This accessory item behaves like a spark ignition coil. Its effect on the tuned external circuit is similar to exciting a bell by whacking it

with a hammer. The tuned version shock excites its own LC circuit, in which the RF generator's filtered oscillations are inductively coupled to the external passive circuit. Obviously, the untuned circuit of Figure 4(a) produces a broader range of shock excited frequencies in the external passive circuit than the tuned version of Figure 4(b). Again from Part 1, we must use loose coupling.

Figure 5 [copied from ref (2)] shows the circuit of the EICO 710 GDO. The oscillator is a Colpitts (tapped C) and the RF indicator is a DC grid-current microampere meter. Notice R1, the sensitivity control. Plug in an appropriate search coil[3], switch the instrument to "oscillator" which provides B+ to the 6AF4's plate circuit. Turn on the instrument.

After a brief warm-up twiddle the sensitivity control. As the resistance of R1 is increased the meter movement moves upscale to indicate more grid current. If you loosely couple the GDO's search coil to a passive tuned circuit and tune the GDO oscillator's frequency through the resonant frequency of the external passive circuit, you will notice a dip in the meter's indication. The "dip" occurs because the passive external circuit absorbs the maximum amount of RF from the external source when it is tuning coincides with the GDO's RF frequency. When absorption increases, the oscillator grid current "dips."

Notice the OSCILLATOR-DIODE switch? In the DIODE position the 6AF4's B+ is removed from the plate of the tube. The grid-cathode acts as a simple RF rectifier vacuum tube diode across the lower part of the search coil-tuning capacitor. This allows the 710 to work as an absorption frequency meter. You may want to look up the references to see how other GDO designs work, including solid state designs, some of which operate well into the mid-UHF region.

Part 3 (conclusion) of this article will appear in the February, 2003 issue. The complete list of references will be included at that time.

THE 2002 ANNUAL CONFERENCE, *continued from page 17*

There was an interesting Marconi 121 receiver in the auction. It was a very nice old piece but was very dirty, the case was missing and two major parts were missing from the front panel. It was first offered for $6,500 in the flea market and then put in the auction with a minimum bid of $5,500. No one would pay that price for a set in that poor condition. There was also a Scott Philharmonic with a minimum of $5,000. The front was beautiful but the chrome pitted and it didn't sell.

The auction ended about 2:30 p.m. after a little more than five and a half hours. There would have been time to sell a few more items. Perhaps next year AWA should raise the auction limit from three sets per person to four or five sets. I would also like to us end the practice opening bids at very low prices such as one dollar and then slowly bidding them up one dollar at a time.The Michigan club starts all bidding at $20 or more and doesn't drop below that level ever. I like that. Some clubs start at $25 minimum. This allows more and better sales to be made. How about it guys? Will you try it?

As the meet has grown larger, parking has become a problem. A few years back, when the Fire Department came in to check us over, we were told to clear cars from all of the fire lanes or we would be shut down for good right then! That's why we must have bus service for those staying at other motels. With busses I noticed that the parking lot was just comfortably full. There is room for people staying at the R.I.T. Conference Center to find a parking spot but not room to add any more cars. The bus is free, makes frequent trips, and goes to all of the nearby motels.

I always make my reservation at the Conference Center well in advance. I suggest you do the same. There isn't enough room for everyone at the facility, but there will be room for you if you reserve early enough. The AWA has searched and searched for a larger facility for this event but has found nothing that comes close to offering the conveniences of the R.I.T. facility. If you have a suggestion for a place that is roomier and still conveniently close to our Museum and Museum Annex, get in touch with Conference Chairman, Hugh Davey. Contact information will be found on the inside front cover of this issue.

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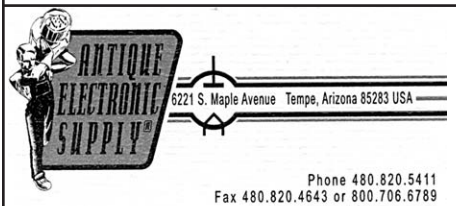

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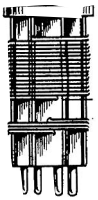
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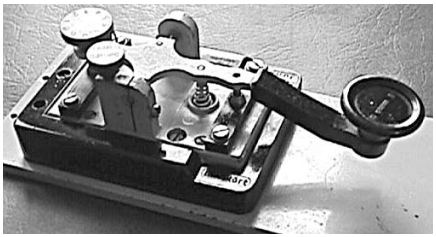
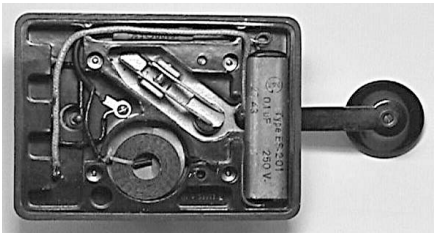
A Twin to Hitler's Key

By William N. Coffey, W2PX

9 CORTLAND DR. BALLSTON LAKE, NY 12019-2645, <WNCOFFEY@GLOBAL2000.NET>

A unique Junker telegraph key, found in Hitler's bunker after the fall of Berlin, has been on display at the AWA Museum for many years. I happened to acquire a similar key in Bamberg, Germany while serving in the Signal Corps during World War II. It's interesting that my key has a complete key-click filter built into the rather substantial Bakelite(?) base. This filter appears to be of the common type used by amateur radio operators during the 1930s. It has an inductance in series with the key contacts, and a series-connected capacitor and a resistor in parallel with the key contacts.





Two views of Bill Coffey's key. Components of key-click filter can be seen built into base.

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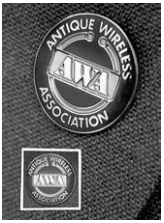

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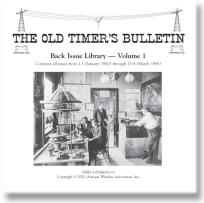
The AWA Review acts as a showcase for some of the excellent research done by AWA members. This volume represents an attempt to link the articles in the Review more closely with the papers and exhibits at the annual AWA Conference in Rochester, NY. Three of the four articles are based on papers or exhibits at past conferences. The fourth article, although not based on a conference presentation, is particularly timely since it reports on the Marconi Wireless Apparatus on the Titanic as revealed and confirmed by the latest photographs of the radio rooms on the wreck.

The articles cover (1) the role that wireless interception has played intelligence gathering from the first days of wireless communication to the present (by Bart Lee), (2) the exact configuration of the Marconi wireless apparatus as confirmed by recent underwater photographs (by Parks Stephenson), (3) the Radio and Seed Business of Henry Field and a discussion of other early broadcasters who were both radio pioneers and radio entrepreneurs (by George A. Freeman), (4) the history of the Rogers Radio Company and their early AC Tubes (by Maurice Chaplin). A "Cumulative Table of Contents" included at the end of this volume lists the title of every article in every volume of *The AWA Review* since it began publication in 1986. *Price: $24.95 US postpaid in US and Canada; elsewhere, add $5.00.*

THE OTB ON CD ROM



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